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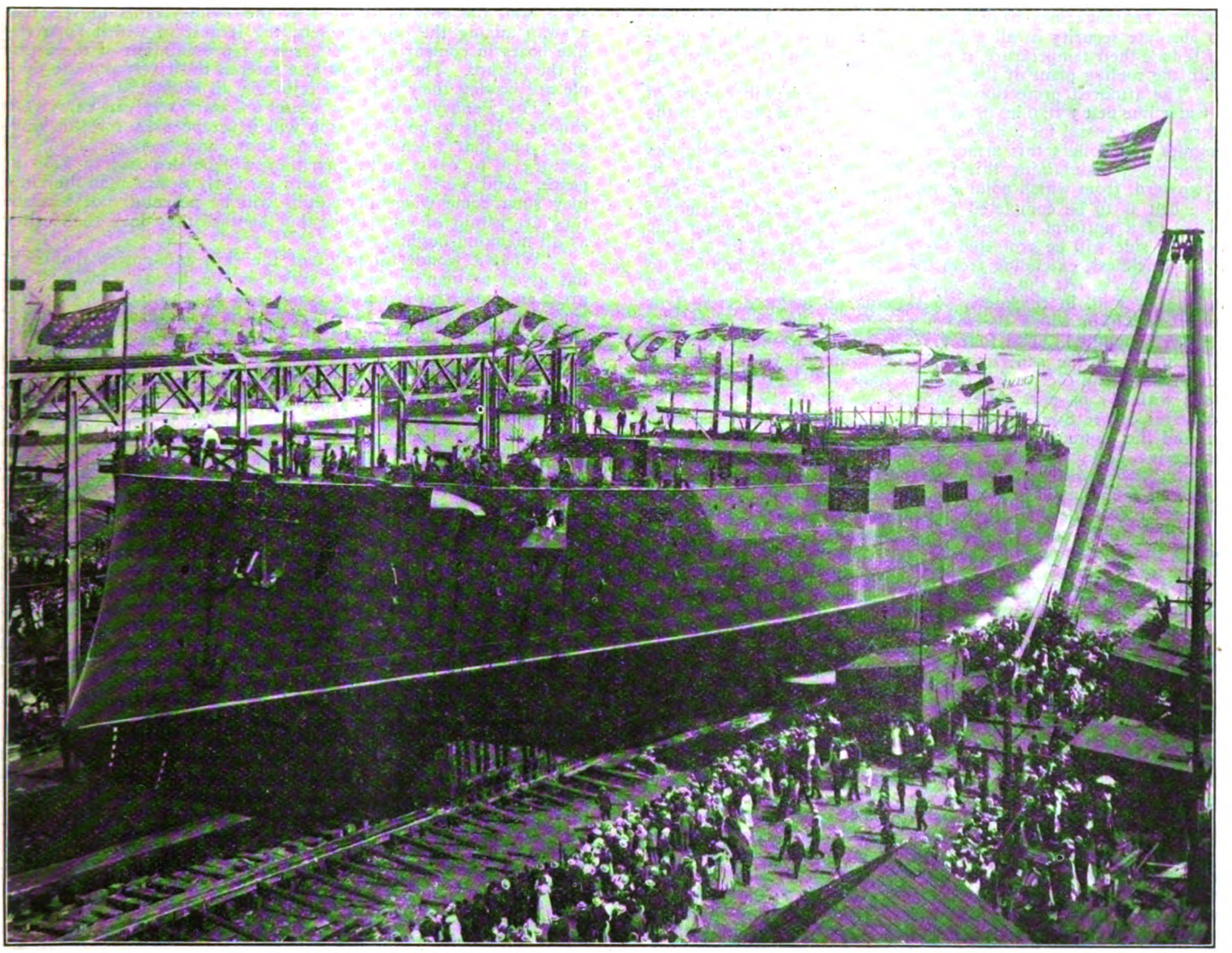
No. 9

LAUNCH OF THE PENNSYLVANIA.

Officials of the Keystone State and the People of Philadelphia Display Great Enthusiasm on the Occasion of a new War Ship born to the Nation.

Philadelphia, Aug. 25.—Not since Mrs. Cleveland, then of the White house, christened one of the American Line steamers in this city several years ago, has there been anything like the display that attended the launching at the Cramp works on Saturday last of the armored cruiser Pennsylvania. The launch was probably witnessed by more people than were ever before assembled at a ship yard in this country. Launches on the Delaware, even of great ships of war, are of such frequent occurrence that the enthusiasm on this occasion must certainly be attributed to great pride of the people of the Keystone state in the name which the ship is to bear. The cruiser was christened by Miss Coral Quay, the daughter of Pennsylvania's senior senator, Mathew Stanley Quay, and this was sufficient cause from a social standpoint for a distinguished gathering. But the chief executors of Pennsylvania and the Philadelphia officials had set out to make the launch one that would be remembered, and the great throng at the ship yard included men foremost in affairs of state and nation. Secretary of the Navy Moody and former Secretary Long, under whose administration the Pennsylvania was authorized by congress, were there, as were also Governor Pennypacker of Pennsylvania and numerous well-known state officials; Rear-Admirals Melville and Sigsbee, with all naval officers who are superintending work at the different Delaware river ship yards, and representatives of the navy department of several foreign governments. The river was a gorgeous sight. Every craft from the smallest launch to the great ocean-going liners, every slip and pier and wharf for miles up and down the Delaware was decorated in honor of the launching. Even the vessels of other countries, departing on long voyages, had all their bunting flung to the breeze. Every passenger craft in the harbor was brought into service and crowded with people who witnessed the launch from mid stream. Arrangements at the ship yard were admirable. Great stands had been erected to accommodate the thousands to whom invitations had been issued, and hundreds of policemen were distributed all over the yard so that everybody who cared to witness the launch might do so without fear of injury or even overcrowding in the large spaces between the building berths. Attention to detail in this regard went so far as to include the attendance of ambulance corps and doctors from two of the hospitals, and their services were needed as the day was very warm and there were several cases of heat prostration. The launch was a great success in all respects and the day one of especial pride for the Cramp company.



Launch of Armored Cruiser Pennsylvania at Cramps. [*Photograph by W. H. Rau.*

Following are the dimensions and general features of the Pennsylvania: Length on load water line, 502 ft.; beam, extreme, 70 ft.; trial displacement, 13,800 tons; mean draught at trial displacement, about 24 ft. 6 in.; extreme draught at full load, about 26 ft. 6 in. In order that the Pennsylvania may have an effective steaming radius provision has been made for a total bunker capacity of 2,000 tons, a figure which is understood to be materially greater than that of any similar foreign vessel. The Pennsylvania will be propelled by twin-screw, four-cylinder, triple-expansion engines of 23,000 H. P., having a stroke of 4 ft. and running about 120 revolutions per minute. To produce this enormous power there are thirty boilers in eight separate watertight compartments, representing a total of 1,590 sq. ft. of grate

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surface and 68,000 sq. ft. of heating surface. These boilers are allowed 250 lbs. pressure and the cruiser is expected to make 22 knots an hour.

The armament of the Pennsylvania will consist of four 8-in. guns, mounted in pairs in two Hichborn electrically-controlled, elliptical, balanced turrets, placed on the middle line, one forward and one aft, each having an arc of train of at least 270°. On the upper deck, at the corners of the superstructure, there will be four 6-in. guns, mounted in sponsons, one in each corner, and each having either a bow or stern fire, with an arc of train at least 145°. There will be, in addition, the gun deck battery of ten 6-in. guns, forming a broadside, five on each side, the arc of fire of each being not less than 110°, or at least 55° forward and 55° abaft the beam, excepting in the case of the forward pair, which are so arranged as to be capable of direct ahead fire. There will also be a very formidable secondary battery, consisting of eighteen 3-in. breech-loading rifles, twelve 3-pounder, two machine guns and six automatic guns of small caliber, mounted in the most commanding positions practicable, and having large arcs of fire. In the lower top there will be two automatic 1-pounders, and in the upper military top a single-shot 1-pounder. In the Pennsylvania, as in all others of recent design, there will be no above-water torpedo tubes, but provision is made for two submarine torpedo tubes located in one compartment forward, fitted for the long, 18-in. Whitehead torpedo.

For the guns above enumerated there will be carried 500 rounds of 8-in. ammunition, 2,000 rounds of 6-in., 4,500 rounds of 14-pounder, 6,000 rounds of 3-pounder, 2,000 rounds of 1-pounder automatic and 1,200 rounds of 1-pounder heavy ammunition. The magazines have been specially designed with a view to absolute security in all climates, special provision being made to reduce their temperature, if necessary, by means of connections with the cooling plant of the vessels.

The armored protection of the Pennsylvania will consist of a water line belt 7 ft. 6 in. in width, extending from the bow to the stern of the vessel for a distance of about 244 ft. Abreast of the engines and boilers this armor will be 6 in. in thickness for its upper edge, maintaining this thickness for a distance of 4½ ft. downward, from which point it tapers to 5 in. at its lower edge. The belt is to be completed to the bow and stern by armored plates of a uniform thickness of 3½ in. Above the water line belt the side will be protected for a length of 232 ft. by a belt 5 in. in thickness, extending from the top of the water line belt to the main deck. At the ends of this armor there will be armored bulkheads 4 in. in thickness, so forming an inclosed citadel or casemate within which the ten 6-in. guns of the broadside battery are mounted. The four 6-in. guns on the upper deck, at the corners of the superstructure, are protected by 5-in. armor casemates. The turrets for the 8-in. guns will be 6 in. in thickness, with 6½ in. port plates and 1½ in. nickel steel tops. The barbettes of the 8-in. turrets will have a uniform thickness of 6 in. and the ammunition tubes, extending from the turret to the protective deck, will have a uniform thickness of 3 in. The conning tower will be 9 in. in thickness, with a 2-in. nickel steel top, and from its base to the protective deck there will be an armored tube 5 in. in thickness and of sufficient diameter not only to permit of the accommodation of speaking tubes, etc., but also access to the conning tower from below the protective deck. The signal tower aft will be 5 in. in thickness. A complete oil tempered and annealed nickel steel protective deck, 1½ in. thick on the flat and 4 in. thick on the sloping sides, is to extend the entire length of the vessel, and a cellulose cofferdam belt 3 in. in thickness, as an additional protection against water line damage which might affect the stability, will be worked along both sides, above the protective deck, for the entire length of the vessel.

The Pennsylvania is to be fitted as a flagship, and provision is made for the proper accommodation of a full complement of officers and men, comprising one flag officer, one commanding officer, one chief of staff, twenty ward room officers, twelve junior officers, ten warrant officers and 777 crew, making a grand total of 822 souls.

Electricity will be extensively used for the transmission of power necessary for the many auxiliaries. The electric generating plant will consist of seven units, each consisting of an engine and dynamo mounted on a combination bed plate. Three of these units will have a rated output of 1,250 amperes each at 80 volts, and the remaining four a rated output of 625 amperes at the same voltage. They will supply, in addition to the current for lighting the vessel, sufficient power for operating the turret turning gear, ammunition hoists, blowers for the hull and turret ventilation, rammers for the heavy guns, elevating gear for the heavy guns, air compressors for charging the torpedoes, machinery in the general work shop, etc. A limited number of the auxiliaries, as, for instance, steering engine, anchor and capstan engine and ash hoisting engines, will be steam driven.

QUAINT DESCRIPTION OF THE FIRST PENNSYLVANIA.

The cruiser launched at the works of the Cramps, Philadelphia, on Saturday last, is the third warship bearing the name Pennsylvania. A quaint and curious description of the launch of the first Pennsylvania is contained in South's Friend, a Sunday-school book of the thirties. In these days of directness it makes interesting reading:

"On July 18, 1837, not less than a hundred thousand persons were collected at the river Delaware, near Philadelphia, to see a ship launched. It was the largest vessel that had ever been built in the United States, and perhaps there never was more than one so large built in the world. It was fifteen years from the time it was begun until it was launched. It measured nearly 250 ft. in its greatest length. If twenty-one such ships were to line in a line, the length of the whole would be a mile. It is 54 ft. high, and one of the three masts (none of which were in the vessel at the time of launching), is 283 ft. high. One of the anchors weighs nearly 12,000 lbs. The ship can carry a weight of 3,000 tons. When such an enormous vessel as this was to be moved from the land into the water, it is no wonder that every one wished to see the sight.

"The ship's name is Pennsylvania. It was built at the edge of the river, under an immense frame house, or rather shed, for it had no rooms in it. When the time for launching came, the end of the shed towards the river was taken away, and great timbers placed under and about the vessel to guide it into the river. The Delaware is a mile in width at that place, and vessels of all sizes and kinds, and filled with people, covered it to a great distance. Ships and schooners, steamboats and wherries, with their flags flying, and their decks and masts crowded, were arranged in view of the great ship. The wharfs, houses, and shores, as far as the eye could reach, were filled with people, many of whom stood for several hours waiting for the launch. At the appointed time two cannons were fired to give notice that the ship would soon be launched. Several hundred men were employed in knocking away the beams that kept it in its place on shore, and in a few minutes the great ship, with a number of persons on board, glided out of the shed into the river. It was a splendid sight, and the crowds shouted as the Pennsylvania moved like a swan among the other vessels, the largest of which appeared like boats in comparison. You see a representation of the scene in the picture. The ship has just entered the river, and the people are waving their hats and rejoicing all around.

"The Pennsylvania is a vessel of war, and can carry 120 canons. It is to be hoped she will never be used for this purpose; but that when the nations know how well prepared our country is to resist an enemy, they will be disposed to keep at peace. And we should still more earnestly desire that the time may soon come when all nations will be peaceful, not because they are afraid of each other, but because they love each other as all mankind ought to do.

"What a wonderful proof of the skill and power that God has given to man in such a vessel as the Pennsylvania! This great and powerful structure is made of pieces of wood, cut, and smoothed, and fastened together, until it becomes the wonder of the world and the terror of all who would provoke its power. How exactly every part must be proportioned in order to make it move so evenly in the water! How strong to meet the winds and waves of the ocean! How wisely constructed, so that by its ropes, and masts, and sails, and rudder, a few men can direct its course wherever they wish to go! Such skill has the Creator given to man. And if such feeble, short-lived beings have this power, what must be His wisdom and might who, by His word, created innumerable worlds, and keeps them undecayed from age to age!

"The ark which Noah built was about the same height as the Pennsylvania, but perhaps twice as long. There were no rejoicings of the people when that vessel was in preparation. They ridiculed the care of the pious man, and despised his warnings. But oh! how would they have crowded into his ark when the waters began to rise above their dwellings, and they saw that their destruction was near!

"The ark has saved the little family for whose preservation it was built, and has long since gone to decay. Very soon this proud ship, and all that looked upon it when it was launched into the stream, will be seen no more. This little book and its readers will be gone, and forgotten on the earth. But there is a shelter, a defence, an ark which is everlasting, and which will protect us in eternity as well as time. You know what I mean. You have enemies far more dreadful than any that can ever attack your country and your homes; and you have a defence far more strong and sure than all the navies of the earth. Your enemy is sin; your only defender and Saviour is Christ; and before you become the irrecoverable prisoners of wrath, escape to Him who is ready to deliver you."

REAR ADMIRAL ON PERSONNEL BILL.

Rear Admiral Charles W. Rae, engineer in chief of the navy, has been very reticent in expressing his views concerning his policy, claiming that it is altogether too early for him to speak. However, he is in accord with the policy of Admiral Melville regarding the education of line officers in engineering duty. He said:

"When asked about two years before the introduction in congress of the personnel bill to express my views as to the best way to remove all friction between the line and the staff, I said I believed the amalgamation of the engineer corps with the line would solve the problem. At the time my remark was considered exceedingly strange as coming from an officer of the engineer corps. I think that the success of the present plan has been sadly retarded by the lack of commissioned officers in the navy, but it is my firm belief that the time is not far distant when it will be clear to all that the amalgamation plan has proven very beneficial to the service in every way."

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BURTON'S EUROPEAN INVESTIGATIONS.

By Ray G. Floyd.*

Glasgow, Aug. 8.—Since the first of June I have accompanied Hon. Theodore Burton and his party in an examination of the rivers and harbors of Europe. The itinerary has been an extended one and has already embraced the principal harbors and rivers of western Europe. Included in the ports we have visited are Genoa, Marseilles, Barcelona, Bordeaux, Havre, Antwerp, Rotterdam, Amsterdam, Bremen, Hamburg, Stettin, Copenhagen, Stockholm and St. Petersburg. While we Americans are gratified with the growth of business in our ports, there has been almost an equal increase in business in some of the ports of Europe, and even greater increase in the equipment and improvement of several harbors. Genoa, Antwerp, Rotterdam and Hamburg have grown in the same manner as ports in the United States. Very expensive and elaborate improvements are under way at Havre. Hamburg, formerly an independent city of the Hanseatic league, has expended $37,500,000 for harbor and channel improvements and is now the leading harbor on the continent and second only to London in its importance.

Improvements are made in quite a different manner in European harbors. The municipality or country having control not only provides adequate channels but constructs quays and docks, and also, especially where the tide is considerable, large basins are provided which may be shut off from the rise and fall of the tide and which afford convenient means for loading and unloading boats at all times. At some places the tide is very considerable. At Havre it is more than 15 ft. On the other hand, at Marseilles on the Mediterranean it is only about 1 ft., yet at Marseilles the French government has built a breakwater which is perhaps the most expensive and elaborate structure of its kind in the world, and has walled off large basins for the anchorage of vessels. An income is derived in all these ports from harbor dues, which, while hardly paying interest on the total expense of improvements, provides a considerable revenue. In some ports these funds are expended for still further improvements.

One noticeable feature of difference from what we are accustomed to seeing in the United States is the great solidity of the quays. They are mostly of stone, though sometimes of brick built on very solid foundations with a large area back of the quay, upon which there are railroad tracks, sheds and warehouses. Most of the European ports lack the improved hoisting and conveying machinery which is so noticeable on the great lakes, but in the adjustment of the railway tracks, convenient access is secured, which might afford an excellent model for us to follow. The improvements at Hamburg have probably been more expensive than in any other city, but in all the harbors visited the sums expended are much in excess of ordinary expenditures in the United States and in nearly all of them far more money has been given than for the greatest of our harbors. All their walls and docks are constructed with a view to permanence. In some places, as at Marseilles and Genoa, the stone is at hand, so that it can be obtained at a very low price, while in others, as at Stettin, Germany, material must be brought from a considerable distance.

Hamburg is not only the largest port in point of commerce but it impresses a visitor most strongly in the variety of its traffic. The number of ships which we saw in the harbor was greater than would be found at New York, though the aggregate tonnage is not so large. The number of vessels going to all parts of the world is especially noticeable. At the same time vessels of a greater draught than 28 ft. cannot come up to the city. The municipal authorities are now at work with a view to securing a depth of 32 ft. In order to secure this deeper channel it will be necessary to construct dykes and do a great deal of dredging between Hamburg and the mouth of the Elbe. The city is about 63 miles from the mouth of the river.

About equal time has been given in this investigation to rivers and to harbors. France has a very elaborate canal system which it is now intended to improve by the expenditure of over 100,000,000 francs or $20,000,000. A program of improvement begun in 1879 is just about being finished, and the country now seems to be entering upon a new era of improvement of inland waterways. The most expensive project is that for a canal from the Rhone river, some miles above its mouth and extending to the southeast to Marseilles. As this goes through a rocky and mountainous country, it will involve very great expense. The Rhone has not at present very great tonnage. This is especially due to the swiftness of the river current, which makes up-stream navigation very difficult. The present tonnage of the river does not exceed 300,000 tons per annum, an amount insignificant in comparison with many rivers in the United States.

A striking item is the amount of freight handled at Paris and Berlin. Paris handles on the same river and connecting canals a tonnage that is much larger than that of any of the sea-ports of France. It is made up mainly of food supplies, coal, raw material for manufacturing and building material, and amounts to over 8,000,000 tons per year. This is hauled in canal boats on the Seine and connecting canals. The maximum depth in the river, extending from Paris to the sea, is 3.2 meters, or a little over 10 ft. A few boats go from Paris to the ports on the coast of France and even to England.

Berlin, which is growing almost as rapidly as any city in the world, receives from canal boats of the Spree river and canals an immense amount of building material—brick, stone, lumber and sand. We found the river and the connecting canals so crowded with boats that it was almost impossible for the little launch on which we made the examination to find its way. The Rhone altogether surpasses all the rivers we have visited in the amount of its commerce. There is a depth of 3 meters (9.84 ft.) from Rotterdam through Holland and then in Germany up to Mannheim. Mannheim is the head of deep water navigation on the Rhine and handles more than 5,000,000 tons of freight a year. Not only are large quantities of coal brought up, but great cargoes of grain, which are unloaded into elevators and then shipped away by rail. This little city of 150,000 inhabitants has expended many millions of dollars in the improvement of the river and in the construction of basins which constitute a harbor. It is in many respects like a growing American city, having large manufacturing interests, including a chemical plant which employs 7,000 men.

Among German rivers the Elbe is next to the Rhine from a commercial standpoint. It is navigable without locks up to Dresden and into Bohemia. Both these rivers, the Rhine and Elbe, are model streams for navigation. They flow from mountainous regions which supply a quantity of water substantially uniform the year round, yet below the mountains the fall is very gradual, and they do not present the difficulty for up-stream navigation that is so great an obstacle in many other rivers. Over 3,000,000 tons of iron ore is brought from Spain and other countries and unloaded at Rotterdam to be carried up the Rhine to the Krupp works at Essen and to other iron works in Westphalia. Ruhrport on the river Ruhr a short distance from the Rhine handles a tonnage even greater than Mannheim, mostly made up of coal.

It appears from statistics that in the twenty-four years from 1877 to 1901, although the railway mileage has increased considerably and the length of navigable rivers and canals available for inland navigation has increased only slightly, the traffic by rivers and canals in Germany has increased very considerably more than by rail. The same is also true of inland navigation in France. Industrial establishments are located with reference to water transportation. Until very recently 15 tons was the maximum load carried by any freight car in Germany. A small number of cars are now in use which carry a much larger load, some of them 35 tons, and the owners of the larger establishments are seeking permission from the government, which owns most of the railways, to build cars of their own to carry the larger loads. In order to secure the introduction of freight cars to carry large loads on all the German railways it would necessary to reconstruct the railways; that is, build heavier bridges, diminish curves and grades and incur great expense, sometimes amounting to practical rebuilding of the whole line. Thus it seems probable that the heavy traffic by water will continue for many years to come.

A great project is under consideration, which has been recommended by the imperial government to the Russian diet, for a canal across the country from west to east, connecting the Rhine near Duisburg and Essen with the Weser at Minden, then with the Elbe at Magdeburg and later by waterways already existing to the Vistula. This proposition has been several times defeated in the Prussian landtag or legislative body, but it is still strenuously pressed by the German emperor and is likely to succeed. The estimate of cost was 240,000,000 marks, or nearly $60,000,000, though it is probable that the total expense will be much more, perhaps twice as much, or even a greater sum. If this improvement is made, the city of Bremen offers to expend 63,000,000 marks, or over $15,000,000 for the improvement of the Weser up from Bremen to the point where this proposed canal would cross the stream.

During the last fifteen years there has been a marked tendency in Germany to insist upon the payment of tolls on canals. The agrarian or agricultural party opposes appropriations for these purposes, on the ground that the improvement of rivers and the building of canals makes the importation of foreign grain cheaper and injures the agricultural interests; also on the ground that it is unfair to the portions of the country not located upon rivers and canals to make them bear the burden of constructing and maintaining waterways which do not immediately benefit them.

In Russia we are intending to go down the Volga for a thousand miles or more. This river ranks next to the Rhine in amount of traffic, and in many ways it is much more important among the rivers of Europe. A singular feature of the traffic upon it is that three-fourths or even more goes up stream. It runs through a very flat country and navigation is furnished by thousands of boats. It is very different from the Rhine as regards railway competition. There are railways on both banks of the Rhine but none paralleling the Volga. Thus a great area of territory depends upon it, not only for the transportation of freight but passengers as well and regular mail boats ply its waters daily. Of this river I shall be glad to send some further details after seeing it, as we hope to, beginning our trip Aug. 3.

*Mr. Floyd is traveling with Congressman Burton, chairman of the committee on rivers and harbors, who is making an investigation of improvements to harbors, canals and canalized rivers of Europe.

The annual meeting of the Colorado Fuel & Iron Co. was held last week and a Rockefeller board of directors was elected. The executive committee consists of J. C. Osgood, F. T. Hearne, F. T. Gates, George J. Gould and John D. Rockefeller, Jr. Unofficial statements of the method whereby the property will be turned over to the Steel Corporation are that it will be done by an exchange of stock upon a basis which would virtually make Colorado fuel common worth 71 and the preferred 95.

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DELAWARE RIVER ITEMS.

Philadelphia, Aug. 25.—The steamship San Jacinto was launched at the Roach Ship Yard, Chester, Saturday. She is being constructed for Mallory & Co., agents for the New York & Texas Steamship Co., and is destined for the Atlantic coast trade. She is a steel vessel, schooner-rigged, with two steel masts. She will carry about 2,250 tons. The first boat for the Mallory Line was built by John Roach in 1871, when the famous yard was first opened.

At the League Island navy yard work has commenced upon laying the concrete of the new dry dock. About 100,000 ft. of concrete, 15 ft. deep, is to be laid. To hasten the work the contractor has built two railroad lines from the landing piers and around the dock. One line hauls the pine piles and runs by gravity. The other hauls the concrete under a heavy wire cable spanned across the dock. An iron pulley running on the cable lifts the load from the railroad tracks and dumps it into place. Naval officers inspecting the dock express themselves as highly pleased with the progress that is being made. This week two gangs of men are at work night and day. It is figured that it will take two years to complete the work. A new electric light plant has been installed near the dock and arc lights make the night work almost as convenient as work in daylight.

The St. Paul, Atlantic liner of the International company's fleet, is at the New York Ship Building Co.'s works, where she will undergo general repairs to machinery and boilers. Just at present, Capt. Randle of the ship building company said, it was impossible to say how long it would take to complete the work or approximate the cost. The work of laying the keel of the new cruiser Washington has not yet been started at the New York company's yard. Work upon the construction of the new blacksmith shop addition will be commenced this week.

Two fruit steamers, the Katie, Capt. Johannesen, and the Watson, Capt. List, are at the Cramp yards, receiving extended repairs as the result of damages received in the recent West India hurricane. The Katie was blown upon the wharf at Port Antonio, despite the fact that she had four anchors out. The vessel, impelled by the fierce wind, virtually battered the wharf to pieces. The Cramp company is also to repair the Italian bark Erasmo. The Erasmo was dismantled and badly damaged on a recent voyage from Genoa to Philadelphia.

The Baldt Steel Casting Co. and the Brylgon Steel Casting Co. are erecting large plants on contiguous land at New Castle, Del. Work has already progressed on the grading, and construction material will be received this week. It is expected that the works will be running about Feb. 1 next and that 2,000 persons will be given employment. The Baldt Steel Casting Co. is capitalized at $300,000. Fully $250,000 will be expended on the plant. Anchors and other marine supplies will be a part of the product of the company.

The trial speed test of the Lord Baltimore of the Ericsson Line, under General Manager Lockhart of the Harlan & Hollingsworth Co., proved the new boat to be fast. She developed a speed of 22.1 miles an hour, exceeding the speed of her sister ship, the Penn, which is credited with 21.7 miles. This makes the Lord Baltimore the fastest vessel of her class on the Delaware. She made her first trip on the Philadelphia-Baltimore route Saturday.

Ten new tugs are in course of construction at the Neafie & Levy ship yards, probably the largest number of such vessels ever before under construction at one time at one yard. In addition to this work the company is actively pushing the construction of the unarmored cruisers Denver and St. Louis for the navy, and the quarantine cutter for the Pennsylvania State Quarantine Commission.

The complaint is fairly general among local ship builders that they are still unable to get material as wanted and hence work on a number of vessels is delayed beyond what it should be.

The British steamer Bloomfield cleared from Wilmington last week with 2,060,000 gallons of crude petroleum, valued at $100,000, the largest cargo of oil ever taken from that city.

Warren Webster & Co., Camden, manufacturers of steam separators and oil separators, are building an addition to their plant, thus enlarging to meet increased demands for their products.

LAUNCH OF THE MISSOURI.

Fully 5,000 persons witnessed the launch of the Atlantic Transport liner Missouri at the works of the Maryland Steel Co., Sparrow's Point, Md., on Thursday last. Her sister, the Maine, was launched last year. The Missouri, too, would have been launched last year had her construction not been delayed by fire. The Missouri is the fourth vessel of a group of six ordered three years ago by the Atlantic Transport Co. Two of them, the Massachusetts and Mississippi, have already been launched by the New York Ship Building Co., Camden, N. J., and two more, building by that company, have been sold to the Pacific Mail Steamship Co. and are now undergoing certain alterations to fit them for Pacific trade.

The Missouri was named by Miss Margaret Felton, daughter of Mr. E. C. Felton, president of the Pennsylvania Steel Co. She broke the customary bottle of champagne as the vessel slid down the ways. The dimensions and general features of the Missouri are: Length over all, 505 ft.; length between perpendiculars, 490 ft.; beam, 58 ft.; depth of hold, 43 ft.; depth of double bottom, 4 ft. 2 in.; displacement, loaded, 17,200 tons; cargo space 527,440 cu. ft.; net register, 5,131 tons; horse power, 5,000; speed, loaded, 12 knots.

The vessel is an all-steel craft with twin-screws and four masts. Her engines are triple-expansion, having cylinders of 25, 42½ and 72 in. diameter with stroke of 48 in., supplied with steam from two double and two single-ended Scotch boilers, fitted with Howden's system of forced draft. The vessel has very limited passenger accommodation but what there is is of the highest convenience. Quarters for the officers and crew are in accordance with the most accepted modern practice. The steamship will cost complete $720,000.

IMPROVEMENTS IN CANAL ENGINEERING.

Canal discussion is a vital consideration in this country at present. This fall the issue of enlarged canals for New York state is to be submitted to the voters in that state. The proposition is to expend $101,000,000 upon enlargement to accommodate barges of 1,000 tons capacity, and while the amount seems large it really only works out to a tax of $1 upon every $1,000 of valuation. It is probably a fair estimate that the average farmer will only have to pay $5 per annum for this improvement. He will save more than that amount on feed and coal, while he will have, in addition, the benefit of a cheap avenue of transportation for his products.

Probably anything on the subject of canals is interesting at the present time. At the recent engineering conference in London Mr. Gerald Fitz Gibbon read a paper upon the topic "Recent Improvement in Canal Engineering," in which he endeavored to summarize what is now being done by the nations in building and improving canals. In introducing his subject he said that he found few improvements to notice in connection with the waterways of Great Britain since the opening of the Manchester ship-canal in 1894. Continuing he said:

"Few new canals have been projected or constructed, the most important being perhaps one of about 5½ miles in length to connect the Sheffield & South Yorkshire Navigation with the Aire & Calder Navigation. This will shortly be completed. It will place the South Yorkshire coal fields in direct communication by water with the ports of Goole and Hull. It is 90 ft. in width at water level, and has a depth of 9½ ft. There is one lock, with a fall of 5 ft., its dimensions being 215 ft. by 22 ft.; other works include nine swing bridges, two masonry aqueducts, and four steel aqueducts, of which the two longest carry the canal over the rivers Went and Don, the former being 177 yards in length and the latter 128 yards.

"Last year parliament authorized the construction of a canal, 5 miles in length, to connect the Medway at Rochester with the Thames, the estimated cost being £245,310.

"The Sheffield & South Yorkshire Navigation is about to improve its waterway.

"The River Weaver Navigation has introduced electricity for working the celebrated Anderton lift.

"The Leeds & Liverpool Canal Co. has improved and is continuing to improve its navigation.

"Abroad great advances continue to be made in inland navigation, and in Europe, as well as in the United States and Canada, the governments and the people are alive to the great advantages to be derived from first-class waterways. Everywhere new canals are being constructed, either entirely by the state or with substantial state assistance.

"Among the most important canals recently projected or completed are the following:

"America.—Buffalo and New York canal, to compete with the St. Lawrence route. The New York state engineer proposes a system of state canals to accommodate boats 150 ft. in length by 25 ft. beam and 10 ft. draught, to be propelled electrically.

"Canada.—Soulanges canal, 14 miles in length, reopened in 1902. The locks accommodate vessels 243 ft. in length by 42 ft. beam and 14 ft. draught. Electricity is used for working the gates and sluices and for lighting the canal.

"Germany.—Elbe-Trave Navigation, improvement of an old canal, with a lock of 262½ ft. by 39 ft., with 8 ft. depth of water on the sills.

"The Konigsberg canal, 20½ miles in length, completed in 1901; bottom width 98½ ft.; depth of water 21 ft.; cost £615,000, the state contributing more than half.

"North sea and Baltic canal, 61 miles in length, opened in 1895. Bottom width 72 ft., with passing places; mean depth 29½ ft. Estimated cost £7,800,000, of which the German empire undertook to contribute £5,300,000, and Prussia, £2,500,000.

"Dortmund-Ems canal, opened in 1899. Length 168 miles, of which 70 miles are canalised river. Standard dimensions of Prussian canals adopted, 59 ft. bottom width, 8¼ ft. depth of water, locks 220 ft. by 28¼ ft., with 10 ft. depth of water on the sills. Cost, £3,070,000.

"Belgium.—Bruges canal, commenced in 1896, 6¼ miles in length, 72 ft. bottom width, 20¼ ft. depth of water. Two-thirds of the cost borne by the state.

"In this country there is an apparent lack of sympathy with canals on the part of the government, which, together with the severe and often-combined competition of the railway companies, who own many of the connecting links of through routes by water, has tended to retard the progress of inland navigation. Notwithstanding adverse conditions, however, some of the more

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progressive navigations are holding their own, by improving their waterways, enlarging their locks, and introducing economical methods of hauling and handling the traffic. The following figures, taken from a paper by Mr. de Hoerschelmann, written in 1894, show what the various governments were spending annually at that time on waterways:—

	Length of navigable waterways. Miles.	Annual sums expended by the State on improvement and maintenance.
Russia	52,817	$ 2,686,500
France	7,939	12,660,000
Germany	6,214	2,625,000
Austro-Hungary	3,728	2,750,000
Belgium	1,380	2,100,000
Great Britain	2,041	.....

"The present mileage of canals in Great Britain is about 3,938 miles, of which 415 miles are derelict or abandoned and 1,264 miles are under railway control.

"Particular attention has recently been directed to electrical haulage and propulsion, and several systems have been tried with more or less success. In France Mr. de Bovet carried out experiments in 1894, on the St. Denis canal, with an electric motor weighing about 2½ tons, placed on a 300-ton barge. The motor, which was supplied with current at 110 volts from overhead wires on the towing path, actuated a drum which picked up a chain laid on the bed of the canal. The current passed through a cable connecting the motor with a small two-wheel trolley running on the line wires.

"The Galliot system, used on the Burgundy canal in 1894-1897, consists of two parts, the electric tricycle on the towing path, supplied with current from an overhead wire, and the rudder motor. The tricycle weighs 2 tons and is capable of towing two barges loaded with 700 tons at a speed of 1¼ miles per hour. The rudder-motor consists of a rudder forming a closed case containing an electric motor, which drives a screw propeller. The system has also been tried on the canal between Douai and Bethune, where the tricycles towed barges carrying 250 tons to 300 tons, at speeds of 1½ mile to 2 miles per hour. The current was supplied at 500 volts. The cost of haulage is said to be 0.038d. per ton, or about half the cost of horse-haulage.

"In Belgium the Gerard system has been in operation since 1900 on the Charleroi canal, 50 miles in length, which connects the coal fields of Charleroi with Brussels. The haulage used to be performed by horses at a speed of 1¼ mile per hour and a cost of about 2s. per boat per mile, which seems very high. By electric haulage the speed was doubled, the cost remaining about the same. The boats have a capacity of 70 tons. The annual traffic amounts to about 600,000 tons. The system consists of a four-wheel electric carriage, weighing 2 tons, of about 5 H. P. (nominal), the current for the three-phase motor being taken from overhead wires through three separate trolleys. There are in all eight wires, of which three are trolley wires supplying current at 600 volts, three are feeder-wires carrying currents at 6,000 volts, and two are for telephone service. The generating stations are 29 miles apart, and sub-stations, 3 miles apart, contain transformers for reducing the current to 600 volts. Electrically-propelled tugs are also employed, to which the current is conveyed through an insulated cable, supported by a boom on the mast. The tugs tow two boats of 70 tons each at a speed of 2 miles an hour.

"In Germany Messrs. Siemens & Halske have experimented with a rack-rail electric locomotive, supplied with current at 500 volts from a single overhead wire. The rack-rail serves as a conductor for the return current.

"In England the Gerard system is being tried on the river Lee navigation, and it would be interesting to know if the result is satisfactory.

"The Thwaite-Cawley system consists of an aerial railway about 10 ft. above the towing path. There are two rails—one for each direction—on which run four-wheel electric motors, two wheels running on the upper surface and two on the lower. The cost of haulage is given as 0.032d. per ton-mile for a speed of 2½ miles per hour.

"In Holland, barges propelled by petrol engines have recently been tried with very satisfactory results. The author invites discussion on the following: The advisability of the inland waterways of this country being owned and worked by the state. The best form and dimensions for inland waterways. The advantages of a level benching under water, and the level at which this should be formed. The advisability of having great width at water level to provide for the draw at the locks. The best mode of protecting slopes against the wash of mechanically-propelled or towed vessels. The relative advantages and cost of haulage by horses, steam locomotives running on the towing path, steam and electric tugs or motors, petrol, alcohol, or compressed gas motors, and independently propelled barges capable of carrying goods and towing other barges. The relative advantages and cost of the different systems of electrical haulage or propulsion already tried on a practical scale."

Mr. Charles M. Schwab has recently been a heavy purchaser of the stock of the Chicago Pneumatic Tool Co., having acquired, it is said, the interest held by Max Pam. It is reported that the par value of the stock was $800,000, and that it changed hands at $70 per share.

CUNARD LINE IN MEDITERRANEAN FIELD.

It looks very much indeed as though the Cunard Line intends to enter into sharp competition with the ships of the International Mercantile Marine Co. Beginning with October, when the homeward rush of American tourists may be said to have ended, the company's steamers Aurania and Carpathia, which are at present in the midweek service between Liverpool and New York, will be transferred to the new Mediterranean service and will be followed as soon as required by other vessels. The new service will be from Boston and a significant feature is that the boats will carry only second-class and steerage passengers. This is accepted in shipping circles as a determination to make a hot fight for the Italian and especially for the Russian immigrant traffic, which are at this time the most profitable traffic in the steamship business. The new service will take in Gibraltar, Genoa, Naples, Palermo, Trieste, Fiume and possibly Algiers. The Dominion Line, a part of the Morgan combine, is already in this service. Mr. Vernon H. Brown, the agent of the Cunard Line, deprecates the statement that his line is attacking the Morgan combine. He acknowledged, however, that the new service was connected with the withdrawal of his line from the Atlantic conference, for the reason that under the conference agreement the line was not at liberty to enter the Mediterranean field. The conference agreement from which the Cunard Line recently withdrew provided that the British lines should be allowed full sway in regard to the British and Scandinavian steerage business in consideration of the British lines leaving the continental and Mediterranean business to the continental lines. This arrangement was entered into at a time when the Scandinavian business was very heavy and was considered an equitable division of traffic by the British lines. With, however, the entrance of the Scandinavian-American Line into the field a readjustment was considered necessary by the Cunard Line. This was not granted by the conference and the Cunard Line served notice of withdrawal. The company has placed orders for two new steamers of the Ivernia class and apparently is out to get all the Mediterranean business that it can.

BRITTANIC TO BE BROKEN UP.

The passing of a famous steamship is like the passing of a famous man, the feeling of sadness is involuntary. The White Star liner Brittanic has gone to Germany to be broken up. This famous vessel was built in Belfast in 1874 by Messrs. Harland & Wolff and is of 5,004 tons gross register. For the long period of twenty-nine years she has been continuously in active service with her original engines and boilers working to the last. With a coal consumption of 110 tons a day and a speed of slightly over 16 knots, the Brittanic was the first to reduce the passage to and from New York to less than 7½ days. When she had to give way to other steamers as to speed, her other excellent qualities were the cause of abiding popularity with travelers. It is interesting to learn that the Brittanic in her Atlantic career made 271 round voyages between Liverpool and New York, in the course of which she carried 112,711 first-class and 282,085 third-class passengers, while the coal consumed for this accomplishment, which covered 2,032,500 statute miles, was no less than 500,407 tons. On the outbreak of the South African war the Brittanic was one of the first liners to be utilized by the government for transport purposes. She made eleven trips to the Cape and to Australia, carrying safely 20,728 troops and steaming 200,409 statute miles in the government service on a consumption of 65,659 tons of coal. In other words, in her long and honorable career the Brittanic steamed 2,232,909 statute miles and consumed 626,066 tons of coal. As a contrast between 1874 and 1902 the following table is interesting:

	Built.	Length.	Beam.	Depth.	Net tons.	Gross tons.
Cedric	1902	681	75	44	13,520	21,035
Brittanic	1874	455	45	20	3,152	5,004

Judge E. H. Gary, chairman of the board of directors of the United States Steel Corporation, denies that there is any prospect of Mr. Schwab returning to the presidency of that corporation. Mr. Schwab was recently quoted as saying that as soon as he regained his health he would return to the presidency of the corporation. This statement was received with considerable surprise, especially by those who are closest to the management of the corporation. If Mr. Schwab made the remark it was a very strange one for him to make. Judge Gary settles the great curiosity manifested in several quarters as to the salary which Mr. Schwab drew. He says that it was $100,000 and that in addition he received a bonus the same as other officials of the corporation.

The British admiralty has decided to build three new battleships of 18,000 tons, which have been designed by Philip Watts, director of naval construction. These are the first vessels designed by Mr. Watts since his appointment two years ago. The most notable departure in the new ships will be in the armor plating for the sides and hull. An armor belt of 10-in. Krupp steel, tapering away to 6 in. will be continued the whole length of the broadside. This is the first time this will be attempted in the battleships of any country. Included in the armament of the new vessels are four submerged torpedo tubes, four 50-ton wire guns, eight quick-firing 27-ton guns and twelve 6-in. guns. The vessels must attain a speed of 19 knots.

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A GREAT LAKES LEVIATHAN.

As was foreshadawoed in the last issue of the Review, the big freighter has come. Mr. A. B. Wolvin of Duluth has placed an order with the American Ship Building Co. for a freighter to exceed in dimensions anything afloat on the lakes, a vessel bigger in fact than was even expected. The new comer will be 560 ft. over all, 540 ft. keel, 56 ft. beam and 32 ft. deep. This is 62 ft. longer and 4 ft. wider than the famous quartet familiarly known as the 500-footers—the John W. Gates, James J. Hill, William Edenborn and I. L. Elwood, which are, to be exact, 498 ft. over all and 52 ft. beam. The new vessel will have thirty-three hatches, spaced 12 ft. centers. This means that each hatch will be 9 ft. fore-and-aft and will be separated from the next hatch by only 3 ft. Aside from this extraordinary number of hatches, she will be distinguished from the ordinary carrier by the hopper construction of her hold. She will have a 24-ft. flat bottom with sides sloping to the deck. There will be a space of 4 ft. beneath her hopper bottom and the bottom of her hull, which space will be utilized for water ballast. Her water ballast will also occupy the space between the sloping sides of her hopper hold and her skin, a decidedly radical departure but which is expected to make for stability, especially in rough weather. The purpose of the hopper form of construction is simply to facilitate unloading by means of the Hulett clamshells. As the extreme width of her cargo-carrving bottom is only 24 ft., every particle of her cargo can be automatically removed by the buckets; and as there is only a space of 3 ft. between hatches there will be no need of shoveling whatever. The ore will be entirely within the sphere of the automatic bucket. This in itself is a big item. It is another evidence of the disposition of the vessel owner and ship builder to adapt their construction to the dock devices for unloading; and it goes a long way toward solving the problem of minimum cost and the quickest dispatch in unloading. This problem is one upon which many minds are working, as is attested by recent performances at Ashtabula and Conneaut. Five thousand two hundred tons have been put into the James H. Hoyt (a new vessel with twenty-one hatches) in 68 minutes and have been taken out in 3 hours and 52 minutes. A performance of almost equal speed has been achieved on the James Gayley, a steamer with fourteen hatches, spaced 24 ft. centers, but in this case some minor hand labor was necessary to bring portions of the ore within reach of the buckets.

The new steamer will carry 9,500 gross or 10,700 net tons on 18 ft. draught. She will be equipped with quadruple-expansion engines having cylinders of 18½, 23½, 42½ and 66 in. diameter with 42 in. stroke. Steam will be supplied by two Babcock & Wilcox water-tube boilers, allowed a working pressure of 225 lbs. and equipped with Ellis & Eaves induced draft. She is designed to make 11 miles an hour loaded on 2,000 H. P. The steamer will be built at the Lorain yard and is to be out by April 1 next.

While a vessel of this type may load at any of the upper lake ports (and it is expected that she can take on her cargo in an hour) there are at present only two ports on the lakes, Conneaut and South Chicago, where she can unload with any dispatch. However, it is the improvement in docks and channels which has brought this leviathan into being and undoubtedly other ports will arrange to accommodate her. The unflagging campaign for deeper draught is altogether in favor of big carrier and this new vessel is unquestionably merely the first of a fleet. She will be able to carry 10,000 gross tons on 18½ ft. draught, or practically once again as much as the present type of large carrier, and 18½ ft. of water for all seasons is a stage which may be said to be at hand even now. Mr. Wolvin has been the leader in forcing the advent of big vessels. As a rule he has been a little ahead of the times. The so-called 500-footers were a little ahead of the times as the stage of water would never permit them to take advantage of their full draught.

Outwardly the new ship will be somewhat unlike the ordinary freighters, as she will have a flush deck fore and aft—that is, she will have no raised deck and no forecastle.

LAKE FREIGHT SITUATION.

Although the lake freight market holds up remarkably well, it may be said to be without support. During 1902 and 1901 rates were maintained by powerful interests which had an object in maintaining them, but that condition cannot be said to exist now. Rates all around are without change of any kind, still those who are concerned in the market realize that it may meet with a decided setback almost any day. The withdrawal of the Steel Corporation from the market for wild tonnage adds to the precariousness of the situation. It is now generally admitted that more than enough ore was brought down last year. Furnaces have ample stockpiles and docks show crowding. The thing which is feared, therefore, is a slump in ore shipment. No one now expects the total of this year to equal that of last. The weakest point is Escanaba, where vessels are more plentiful than cargoes, a condition which has obtained for some time, owing to the absence of grain at Chicago. It is expected, of course, that grain will move freely next month, and in this lies the hope of vessel owners. Very little grain has been moved this year, and it is reasonable to expect more than ordinarily heavy shipments of this commodity during the fall months, as the crop reports are quite favorable from some quarters, but whether the grain movement will be sufficient to adequately bolster the market remains to be seen. The fall months are assuredly an uncertain quantity, since so many influences may tend to make or unmake the market. Should the Steel Corporation suddenly conclude that it had moved all the ore it required, it is not easy to perceive how the market could escape demoralization. Coal is still going forward freely. Vessels of the Steel Corporation are of late carrying quite a large amount of coal.

COLUMBIA IRON WORKS AFFAIRS

A meeting of the creditors of the Columbia Iron Works will be held at the Oakland hotel, St. Clair, Mich., today (Thursday) to listen to the report of a committee which was appointed at a meeting of some of the creditors last Thursday to consider the advisability of a reorganization of the company with all the creditors as stockholders. The plan proposed at last week's meeting was as follows:

Organize a new company with capital stock of		$300,000
Issue to creditors in payment of their claims	$225,000	
Issue to present stockholders	50,000	
Issue to preferred stockholders	11,000	
Reserve in treasury for sale	14,000	
	$300,000	
The new company will then own free from debt the entire plant and material on hand subject to:		
Gilchrist Trans. Co., advance payments	$ 75,000	
State Savings Bank, assignment of contracts	100,000	175,000
To complete the two Gilchrist boats in addition to the work already done, estimates are as follows:		
918 tons steel	32,000	
Labor on hulls	100,000	
Engines, labor and material	38,000	
Boilers, labor and material	22,000	
Forced draft	11,000	
Outfit and incidentals	50,000	253,000
(There is material on hand to enter into these boats aggregating in value $177,500).		
There is also needed to complete plant:		
Ship crane	2,000	
Boiler shop crane	3,000	
Miscellaneous	5,000	10,000
Total additional money needed to complete plant and boats		263,000
The two contracts will produce:		
Balance cash from Gilchrist Trans. Co.	175,000	
Balance cash from bonds	140,000	315,000
Leaving net profit for the company		52,000
The new company will then have a complete plant consisting of 35 acres of land		25,000
Buildings, tools, equipment, keel blocks, track improvements, etc.		241,643
Net earnings from construction of two boats		52,000
Total assets		$318,643
Total outstanding stock		280,000
Surplus		$ 38,643

In order to carry out this scheme it is expected the Gilchrist Trans. Co. will extend the time of carrying out its contracts and make payments all in cash, and that the State Savings Bank will take the two issues of bonds at par.

At the meeting today (Thursday) Joseph Walsh of Port Huron representing $30,000 worth of claims, N. D. Carpenter, representing the Carnegie Steel Co., which has a claim of $8,000

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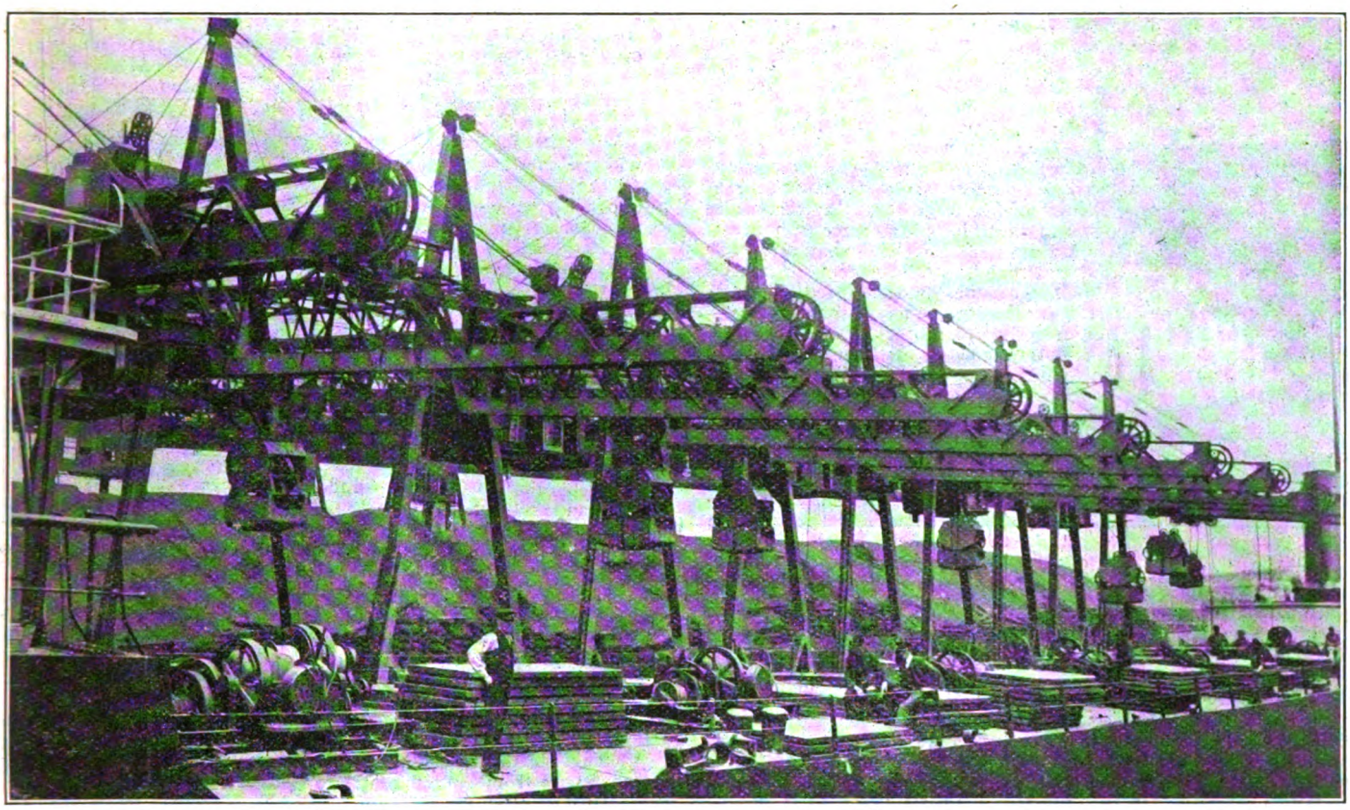
against the yard, and Alexander Moore of Port Huron, an attorney, will make a report as to the advisability of trying to carry into effect the plan outlined above. They were appointed a committee to investigate the accuracy of reports submitted at last Thursday's meeting and to go into the matter of inventory.

ROAD SCRAPERS FOR UNLOADING ORE.

Reports from ore docks of M. A. Hanna & Co. at Cleveland, Ashtabula and Erie, that have been operating this season what are known as Andrews scrapers working in connection with grab buckets for hoisting the ore, would indicate that the three docks thus equipped have for the money expended the most efficient apparatus for unloading ore thus far devised on the lakes. At all of these docks recently modern ore carriers, 5,500 to 6,000 gross tons capacity, have been unloaded in 9 to 11 hours working time, with no shoveling of the ore into buckets, every ton of it being taken out by the scrapers and grabs. Men in charge of these docks are all confident that later on, with liberal supplies of cars into which the ore is unloaded, they will repeatedly start in the morning on vessels of the 5,500 to 6,000-ton kind and finish them at the usual quitting time in the evening.

In an illustration herewith of an ore carrier at dock will be seen at the several hatches the electrical winches that operate scrapers in the vessel's hold. The simplicity with which the scrapers are operated and the moderate cost at which the old dock rigs of Brown and King kind have been made, with grab buckets, to do this fast work is what has attracted special attention to this method of unloading ore. The system is the outcome of considerable experiment on the part of M. Andrews, dock superintendent for M. A. Hanna & Co., who now modestly says there is no great achievement in what has been accomplished—that he was simply forced at two of the docks last spring to find some method of completely finishing the unloading of a vessel and that he "fortunately struck on the use of the road scrapers."

It is, of course, necessary to have an electric plant on the dock for the transmission of power through the small machines at the hatches to the scrapers. It will readily be understood, however, that the power required for the work, even at all the hatches, is not great, as the scrapers are not necessarily larger than those used in grading or in excavations on shore. The scrapers could be used to advantage in trimming hard coal in vessels and also in unloading vessels of hard coal where grab buckets are used and the system will very probably be extended to these services. When unloading ore five men are employed at each hatch, with two scrapers. One man, standing between decks or in the hold, regulates by means of two ropes the small machine above him, stopping or starting it, increasing or reducing its speed as necessity may require, just as easily as the operator of a street car controls the power by the lever in his hands. The other four men operate the scrapers, two to each of them. When one scraper is coming towards the center of the hatch with its load of ore the other is going back empty in another direction. The scope within which the scrapers may be operated is not, of course, limited to a single hatch. They might it necessary be drawn back and forth for the length of two or three hatches, or even the entire length of the vessel.



Electrical Winches Operating Scrapers in the Vessel's Hold.

NEW WHEAT AT THE HEAD OF THE LAKES.

Duluth, Minn., Aug. 26.—New wheat has begun to arrive at Duluth—Superior, and to judge from the first few cars it will be of fine quality. The bulk of the crop is expected to grade (a wet fall excepted) No. 1, with some off for occasional smut. The first day or two showed, also, that there is much wheat to come, for the initial receipts were unprecedentedly large. Unusually new wheat dribbles in for the first week or so at the rate of a car or two a day, and it has not been known to show up with more than two cars the first day. The first day this fall there were eight cars, the second five, and there were nineteen more on Monday. It is expected that receipts by the close of the present week will be well up toward 100 cars a day, for a great deal of grain is turned this way.

New flax is being taken at many country stations by elevators and will be coming this way this week. There are no changes in recent crop estimates, except that much of the late flax, that was unsafe a week or so ago, is now out of danger. There are now accured not less than 27,000,000 to 28,000,000 bu. according to most figures. New barley is coming in quite rapidly and stocks showed this week an increase of about 50,000 bu.

Whalen & Bowman's dredges at Port Arthur are working sixteen hours a day to complete their contract for deep water to the Canadian Northern Railroad elevator and dock. This completed they will begin work on another contract, that of deepening the channels to the new elevator under construction by Barnett & Record. In this work they will be busy day and night until winter. Their contract for deepening the channels to Fort William is completed. New wheat has not as yet begun to arrive at these two Canadian terminals but is expected in a week or two.

For many years masters of lake craft have avoided Michigan City because of the constant sweep of water from east to west past the harbor mouth. Dozens of schooners have been wrecked or stranded there and the government's best engineers have fought the waters in vain until now. In carrying out the scheme to baffle the current all previous plans of harbor improvement were abandoned. A new breakwater 1,400 ft. long was constructed and an extension 600 ft. long was added to the pier constructed there several years ago. The last section of the breakwater was sunk this week by the Chicago & Great Lakes Dredge & Dock Co., when it was found that the current was deflected, leaving an opening 500 ft. wide free from its force. The contracting company has still to remove an old breakwater 700 ft. long, abandoned when the new plan for the harbor was adopted.

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SHALLOW-DRAUGHT STEAMER FORTUNA.

A very fine example of a river yacht is illustrated herewith. It is named Fortuna and was built by the Marine Iron Works, Chicago, for Mr. James M. Parmelee of that city. Those who are acquainted with deep-water craft only will be greatly surprised at the extent and completeness of many of these pleasure craft on the rivers and shallow waters of the southern coast. They combine all the advantages of the house boat of the Atlantic coast with the addition of an adequate system of propulsion and a draught which enables them to enter the numerous bayous and shallow lakes so common on the southern coast. For instance, while the Fortuna has a length over all of 119 ft. 9 in. and beam of 24 ft. 6 in. her draught is only 2 ft. This allows her to go practically anywhere. Many of these craft are in service on the large river systems, such as the Mississippi, Missouri, the Red and their numerous tributaries. Some hunters and fishermen live in them for a long time, carrying a complete outfit of small boats, guns, dogs, fishing tackle and a complete cuisine. The parties separate in the morning and return to the steamer at night and thus manage to effectively combine the luxuries of civilization and the sports of the field. The Fortuna is one of the most elaborate and complete of her class, generous provision being made for the comfort of all on the boat, including the crew and servants. All rooms are large with high ceilings and big windows, so as to provide a maximum comfort in southern waters. The hull attracted considerable attention during the process of building, the system of bulkheads and bracing to secure stiffness on so large and so shallow a steel hull being much admired. As an instance of the skill with which the Marine Iron Works is building this style of steamer it may be noted that on launching the Fortuna it was found to be within ¼ in. of its designed draught.

The Fortuna is 119 ft. 9 in. over all, 103 ft. keel, 23 ft. molded beam, 26 ft. 6 in. beam over guards, 4 ft. deep and 2 ft. draught. The hull is subdivided by six watertight bulkheads. The engine is of the double high-pressure type with cylinders of 9 in. diameter and stroke of 42 in. She is equipped with one Roberts safety water-tube boiler, having a heating surface of 1,060 sq. ft. and a grate surface of 41.60 sq. ft., allowed steam pressure of 250 lbs. Her indicated horse power is 134 and the speed which she is designed to make is 11.5 miles. The vessel will be lighted throughout with electricity, having sixty 16-candle-power lamps and one 1,000-candle-power searchlight. Her fuel capacity is 17 tons and her ice storage capacity 2,000 lbs. She has also one 192-gal. flushing water tank and two 192-gal. drinking water tanks.

The entire hull is of the finest steel construction throughout. The cabin arrangement is very complete, the main cabin being finished in bird's eye maple. The owner's room and one of the guest's rooms is finished in mahogany. The hallway, dining room and extra state room are in oak. The bath room is in bird's eye maple with vitreous tiling and wainscoting. The galley is wainscoted with tile and has tile floor. The crew's quarters and engine room are of liberal size and very comfortably furnished.

On Saturday last the steamer Robert L. Ireland, building for the Gilchrist fleet, was launched from the South Chicago yard of the American Ship Building Co. and was christened with champagne by Miss Maud Ella Fitch of Oak Park. The Ireland is 436 ft. long, 50 ft. beam and 28 ft. deep and is named after Mr. Robert L. Ireland of Cleveland, one of the most popular officials of the ship building company.

CANADIAN SHIPPING NOTES.

Midland, Ont., has been constituted a port of registry for shipping.

The Collingwood Ship Building Co. expects to have ready for launching early in October the tug which they are building for the Montreal Transportation Co.

The Puget Sound Navigation Co. is negotiating for the construction of a 250-ft. steamer, to be placed on the run between Victoria, B. C., and Puget sound ports.

The Chatham (Ont.) board of trade is offering inducements to the owners of a steamer or steam barge to open a route from Chatham to Sault Ste Marie and north shore ports.

The hull of the burned steamer Montreal is being removed from Montreal to Levis, Que., by the Richelieu & Ontario Navigation Co. It will be thoroughly examined and rebuilt.

The Montreal Harbor Commission has placed a contract with La Cie Pontbriand, Sorel, Que., for a new harbor tug. The tug will cost $30,000 and is to be delivered by June, 1904.

Nova Scotia shippers report that there is a great scarcity of small tonnage offering for charter. One company wants fifteen or twenty schooners, small and medium size, for coal cargoes.

A general overhauling has been given to the St. John (N. B.) ferry steamer Ouangondy, so that she may be kept in service until a new steamer, the plans for which are under consideration, is built.

It is generally believed that an agreement reached between the St. John (N. B.) city council and the Imperial Dry Dock Co. will result in an early start being made upon the construction of a large dry dock.

The steamers Stanley Dollar and M. S. Dollar, recently transferred from United States to British register, will be placed in the Oriental trade, running from Tacoma to Japan and China and returning via San Francisco.

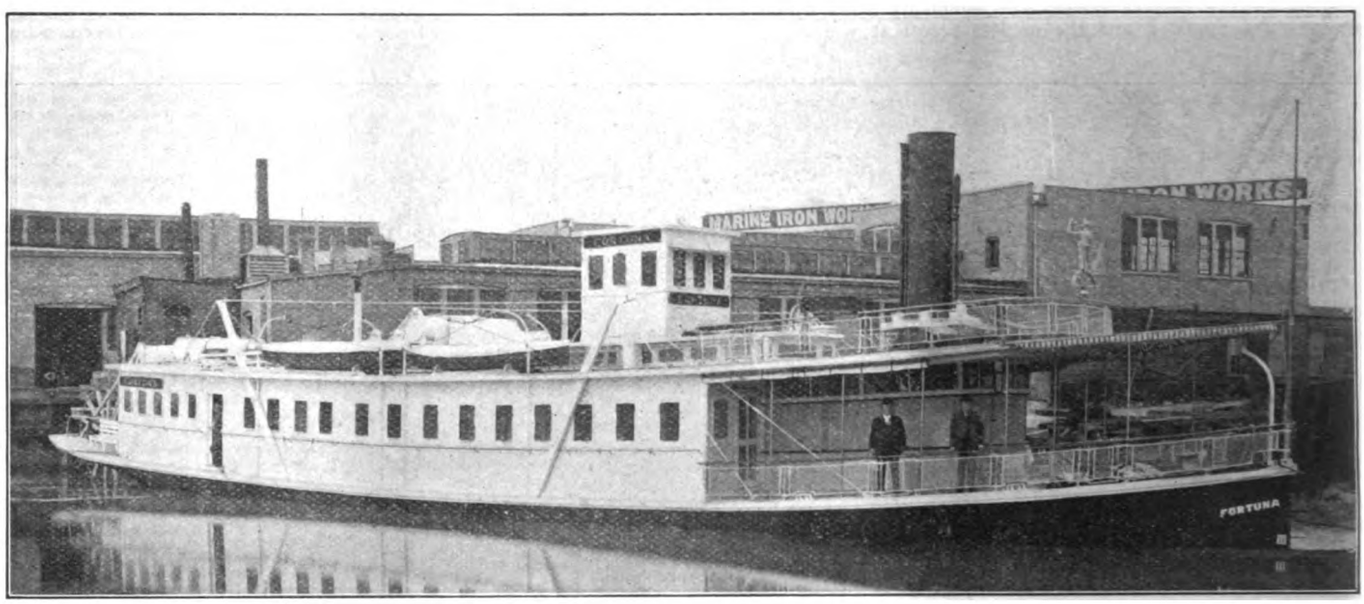
James Playfair's large steel freight steamer Midland King, to hail from Midland, Ont., was launched from the works of the Collingwood Ship Building Co., Collingwood, Ont., a few days ago. She is a sister ship to the Midland Queen, built at Dundee, Scotland, in 1901.

The Canadian North West Steamship Co., Ltd., has been licensed under the laws of Ontario by G. T. Marks of Port Arthur, Ont. This is the company operating a number of steamships owned by separate companies in which G. T. Marks and H. A. Wiley are interested.

Grand Trunk Railway officials state that the company will not have any financial interest in the vessels which are to be placed on a projected grain-carrying route from Chicago and other United States ports to Goderich, Ont. This is in line with the general policy of the Grand Trunk not to own steamers but to make close traffic contracts with steamship owners.

The Thunder Bay Harbor Improvement Co., Ltd., has been incorporated under the Ontario companies' act, with a capital of $50,000, to construct piers, wharves, etc., at Port Arthur, Ont., and to own and operate vessels. Offices of the company are to be at Port Arthur, and the provisional directors are R. Vigars, J. Whalen, W. Vigars, G. F. Whalen and W. F. Langworthy.

Shipping men claim that the pilotage system on the St. Lawrence is not what it should be, and there are not wanting those who affirm that the system is responsible, to a considerable extent, for the grounding of so many vessels in the channels between Montreal and Quebec. The Dominion government has decided to look into the whole question of pilotage with a view of effecting reforms.



Shallow-Draught Steamer Fortuna. [*Built by Marine Iron Works, Chicago.*

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AROUND THE GREAT LAKES.

The dredge operators have agreed to advance the wages of dredge workers 12½ per cent., beginning Sept. 1.

The trouble with labor at the Buffalo and Bay City yards of the American Ship Building Co. has been adjusted and the men have returned to work.

Another of the Great Lakes and St. Lawrence Line of steamers, the Robert Wallace, is in commission. She has just taken on grain at Duluth for Montreal.

A 900-ft. stretch of new ore dock has been started by the Lorain Steel Co. at the site of their new blast furnace. Modern ore handling machinery is to be installed.

It is claimed in Ottawa that since the abolition of tolls on the Welland and St. Lawrence canals by the Dominion government the grain traffic of the St. Lawrence route has increased 100 per cent.

Light house officials give notice that about Sept. 1 red lens-lantern lights will be established on the easterly side of the mooring revetment at both northerly and southerly ends of Lily pond, Portage Lake ship-canals.

An Ottawa dispatch says that the Great Lakes & St. Lawrence River Transportation Co. (Wolvin syndicate) will build at that point a floating elevator to replace the one recently destroyed by fire at Louis Bay.

It is reported from Port Huron that the Seither Transit Co. of Cleveland is figuring with the Jenks Ship Building Co. for the building of a steel hull of 5,000 tons capacity for the machinery of the steamer V. H. Ketcham.

Maj. J. H. Warren, United States engineer at Milwaukee, is making a survey of the harbor at that place to determine what further improvements are needed. He very sensibly advocates the removal of center-pier bridges.

In order to satisfy a claim for salvage brought against her by the Dominion Atlantic Railway Co., the little fishing schooner Altama was sold in Boston on Thursday for $200 to J. H. McDonald of Nova Scotia. The Altama was built in Cleveland in 1871 and for a number of years was a yacht on the lakes. She was afterwards taken to the coast and put in the fishing business.

About Sept. 1 a 10-in. steam whistle will be established at the Raspberry Island light station. Raspberry island is one of the Apostle group and the station is on its southwesterly point. The whistle will sound during thick or foggy weather blasts of 3 seconds' duration separated by silent intervals of 17 seconds. The new fog signal building is a red brick structure with red roof.

"I have, of course, had an eye on the new hatch fastening devices," says Capt. M. Mulholland of the steamer Alva. "Several of them have appeared since mine, the first one to be successfully used, was adopted on a large number of lake vessels. I have recently made an important improvement in it and I still believe it can not be beaten. It is safe, durable and quick of operation."

Daniel G. McAlpin, who died in Detroit last week, was a well known vessel owner, builder and wrecker in the early days. He was born in Trinidad, West Indies, July 1, 1822, and received his education and practical knowledge of marine engineering and ship building at Glasgow, Scotland. He was associated with the late John Pridgeon and S. B. Grummond in their vessel properties and was one of the executors of the estate of the late Darius Cole.

Maj. Bixby, United States engineer in charge of the Sault canal, has under consideration bids for new ten-valve engines that are to be installed during the coming winter at the Poe lock. The bids are as follows: Vulcan Iron Works, Chicago, $6,990; Variety Iron Works Co., Cleveland, $7,000; Power Specialty Co., New York, $7,425; Great Lakes Engineering Works, Detroit, $8,350; Allis-Chalmers Co., Chicago, $9,750; Buffalo Forge Co., Buffalo, $14,700.

It is as much as a master's life is worth these days to even look at any member of his crew. The captain of the Gilchrist steamer Hiawatha had occasion to discharge a wheelsman at Detroit this week and the second wheelsman and two lookouts automatically quit. The Seamen's union refused to furnish new men and a crew of non-union men was headed off by the ubiquitous walking delegate. The Hiawatha left Detroit short handed, pursued by telegrams from the Seamen's union.

Wheelsmen and watchmen employed on half a dozen passenger steamers running out of Chicago quit work last week upon ten minutes' notice. The ten minutes selected were those immediately preceding the departure of the vessels from their docks. The Graham & Morton, Goodrich and Northern Michigan were the lines selected. Surrender was made by the companies and an advance of 50 per cent. in wages given. The advantage which the men took was manifestly unfair and reflects no credit upon them.

While an electrical storm was at its hight at Ogdensburg last week the steamer Massena was struck by lightning and took fire. Capt. Dunn, dazed by the bolt, tried to rally his crew to fight the flames. The sailors were unable to gather before the flames had spread from one end of the ship to the other. Hedged in by fire some of the crew jumped for their lives into the water. The Massena drifted from the pier, setting fire to a warehouse, which was almost destroyed. The steamer was owned by Capt. Dunn and was insured for $6,000.

The affair between the Canadian patrol boat Petrel and the American fishing tug Silver Spray has produced no international complication but only a renewed determination on the part of the Canadian government to protect its fisheries. The next time a fishing tug crosses the line it will be rapped for good. Minister Prefontaine, in charge of the marine and fisheries department, said that nothing would be left undone to safeguard the fishing industry as far as Canada is concerned. Capt. Dunn in his supplemental report says that he fired first across the bows of the Silver Spray and afterwards directly at her. He fired thirteen times but did not use the 7-pounder.

Maj. W. H. Bixby, government engineer at Detroit, has addressed the following letter to Maj. W. L. Fisk, in charge of the lake survey with headquarters at Detroit: "On Aug. 8 the steamer Hancock removed from the lake bottom of the improved channelway across lower Lake Huron shoals, above Port Huron, an old anchor weighing about 2,200 lbs. This anchor was picked up in about 22 ft. depth of water (at a Lake Huron stage of 580.0), at a point about 1 mile north by west from the light vessel. The anchor is apparently of English make, bears date of 1819, and has undoubtedly been a long time in the water in its present position. Its anchor stock must have stood at least 4 ft. above the river bed, so as to have been easily struck by any boat drawing over 18 ft. of water, and the stock shows evidence of having been struck several times. It is, therefore, exceedingly probable that this anchor is the obstruction hit and complained of by the Milwaukee a few weeks ago."

Maj. W. H. Bixby, government engineer with headquarters at Detroit, has just made an inspection of the waterways of his district in company with Col. O. H. Ernst, chief of the northwestern division. Maj. Bixby reports that all of the old work is progressing very satisfactorily and coming to a close. The new work, for which money has been appropriated, will begin next spring. He says the improvements at Sailor's encampment and in Little Mud lake are proving of great benefit to commerce, as is also the work completed in upper and lower St. Mary's river, where corners are to be rounded off and the channel widened in some places. Vesselmen are likewise well pleased with the work on the Black river shoal, St. Clair river. This shoal was forming for years and a number of the big freighters grounded there. Last season the buoys were moved, narrowing the channel at that important spot very materially. The government advertised for emergency bids for dredging and the work is now about completed.

The wooden steamer Queen of the West foundered off Fairport last Thursday morning, and had it not been for the timely arrival of the Anchor Line steamer Codorus it is quite likely that some of the crew would have been lost. As it was, only one of the crew was injured, a wheelsman named Patrick Maloney of Baltimore, Mich., who in jumping from the Queen of the West to the Codorus missed his footing and fell between the two vessels. Three of his ribs were crushed. Misses Mabel and Jennie Drouillard of Toledo, daughters of the chief engineer, narrowly escaped from being swept overboard in the heavy seas that were breaking over the Queen of the West. The steamer dropped her two consorts, schooners H. W. Sage and May Richards, off Cleveland early Thursday morning and started for Erie. A fresh breeze was blowing and by 3 o'clock the seas were breaking over the vessel. Shortly after 4 o'clock she sprung a leak from laboring in the seaway. All the pumping appliances were put to work, but the water gained and the steamer listed and settled with every sea. An attempt was made to launch the lifeboat, but it was lost and the sea was smashing everything on deck. Distress signals were sounded and the steamer Codorus responded and succeeded in taking everyone off. The Queen of the West sank at 7:30 o'clock and is a total loss. The vessel was owned by C. L. Hutchinson and others of Cleveland and was insured for $10,000, a sum that did not represent her full value. Her cargo consisted of about 1,500 tons of ore, which was fully insured. Maj. Kingman, United States engineer of the Cleveland district, immediately ordered the wreck marked by a buoy. It is about 7¾ miles northwest of Fairport harbor. At last accounts about 5 ft. of one of the masts was above water.

MR. FOLLETTE'S CANAL BOATS.

Concerning the recent newspaper notices that he was rehabilitating the old Rose ship yard on Ellicott creek, Buffalo, for the construction of canal boats of a special type Mr. W. H. Follette writes as follows:

"The kind of boat I am now building is one for use on both the Erie canal and in New York harbor and Long Island sound. The boat is 100 ft. long, 18 ft. beam and 11 ft. deep. On the present canal they cannot carry any more in tons than the old style boat, but in light grain, such as oats and malt, they can carry at least one-third more than the old class boat. When the new barge canal is built they will be able to carry 400 tons each, which they now do in New York harbor and Long Island sound. During the past ten years there has been constant legislation for an enlarged canal with the result that it has stopped boat building altogether. Boats are now so scarce that it is really important to get some in operation before the enlargement is completed. My idea is to get in commission the largest boat possible that will navigate the canal in its present state."

The Hamburg-American Line has contracted with the ship building firm of Blohm & Voss of Hamburg for the construction of a large steamer to be used for northern excursions in the summer and for oriental trips during the winter months. She is designed to accommodate upwards of 1,000 passengers.

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TRANSFERS OF BIG IRON MINES.

Duluth, Minn., Aug. 26.—The two most important purchases of mineral lands in the Lake Superior region of late are those just closed by the United States Steel Corporation and the International Harvester Co. These have already been briefly referred to. Details of operation are now being arranged. Contracts for fifty dwellings and other buildings for the Monroe mine have been let by the Minnesota Iron Co., branch of the United States Steel Corporation, and immense stripping contracts, to be the largest ever let on the Mesabi or any other range, will probably be placed shortly. It is expected that bids will be at a lower figure than that paid for recent work; indeed if they are not the company may not let the whole job at this time. This mine is known to contain nearly 30,000,000 tons of ore and may have more than that. It is one of the eleven properties just bought by the Steel Corporation from the Chemung Iron Co. and is the largest of them all. This property once belonged to Corrigan, McKinney & Co. of Cleveland, who let it go at a slightly advanced royalty. The fee owners are the John S. Pillsbury estate of Minneapolis, 50 per cent; R. M. Bennett of Minneapolis and John M. Longyear of Brookline, Mass., 47 per cent, and E. J. Longyear 3 per cent. The Chemung Iron Co's royalty is 25 cents. In a year or two this will be one of the very large producers of the Mesabi range.

The entire holdings of the Chemung Iron Co., including the Monroe and ten other partially developed mines, have passed into the hands of the Steel Corporation. The deal is one of special significance, as this was the only large block of Mesabi ores left on the market, outside of the J. J. Hill ores, and might have been the nucleus of important steel-making rivalry. It will now be difficult, without treating with several owners and rounding up a lot of different interests, to get together enough Mesabi ores to warrant any large steel-making investment. Some of the Chemung properties are capable of being mined open pit, steam shovel and milling, some are underground, some are Bessemer, some non-Bessemer, some especially easy for furnace requirements, and together they furnish an excellent range of wide adaptability, which is itself of much value. The sale was made on the basis of advanced royalty prices, and was on terms favorable to the Steel Corporation. There are about 900 acres in these Chemung tracts and the tonnage runs from more than 25,000,000 in the Monroe, with 9,000,000 or 10,000,000 each in the Chemung and Niles to less than 1,000,000 in some of those partially explored. Chester A. Congdon and Henry W. Oliver, who are the Chemung company, have been gathering and exploring these lands for three or four years past. They have paid especial attention in their selection to securing ores of easy furnace working and of good grades. The average grades of their ores is much better than what is generally being found today on the Mesabi range.

The chief value of properties bought by the International Harvester Co. from the Deering Harvester Co. probably lies in the Agnew mine. This mine probably contains a great deal more ore than has been shown up. The Agnew is a Mesabi range, Hibbing, mine, a 25-cent lease on which was secured by the Deering people about a year ago for $150,000. This mine has now in sight about 6,000,000 tons of ore, half Bessemer and running about 61 per cent. in iron. It is an underground mine and is shipping steadily this year. The next property in point of value is the Hawkins, in section 31 and 32, T 57 R 22, which has some 10,000,000 tons of about 56 per cent. ore, partly non-Bessemer. This is a 20-cent lease bought by the Deerings for $525,000 last year. This mine is being stripped for mining by the milling process, and a considerable tonnage is being taken this year, though not as much as was expected earlier in the year.

For the Agnew and Hawkins, for the only mine thus far opened in the new Baraboo, Wis., district, and for two explorations at Crystal Falls, the International company pays $3,500,000 cash, or its equivalent. The Baraboo properties have, as a differential in their favor, just the present rate of lake freight from Duluth to Lake Erie, as they reach Chicago by rail at an 80-cent freight charge, which is the Mesabi range rail rate to Lake Superior. A rate even less than this for the Baraboo properties is expected when the Chicago, Milwaukee & St. Paul road is in the district. This road is now but a few miles away and is exploiting for iron and surveying for rail connections. Then, too, Baraboo can ship to Chicago furnaces all the year round. The ore is not of especially high grade but is better than generally reported, and its shipping differentials assist it. Mines at Baraboo will probably be quite wet. The International Harvester Co. has held an option on these various properties for some time and has been engaged in their examination. It may be that there can be shown on them at this time 20,000,000 tons of merchantable ore, with an average royalty of about 20 cents a ton. Reducing the cash bonus to royalties on the basis of probable production in the customary way, the gross royalty to be paid by the International company during the life of the mines cannot be much less than 60 cents a ton. This is probably a higher price than has generally been paid for Mesabi range properties, though negotiations on a considerably higher scale have been currently reported of late as pending between the United States Steel Corporation and the Great Northern Railway officials.

MR. A. C. DINKEY.

During the past few years young men have been so conspicuous in various walks of life that the age has commonly come to be regarded as the age of young men. In point of fact all ages have belonged to young men. Alexander was scarcely thirty when he died, having already conquered his known world. Napoleon was only twenty-six when he projected his brilliant Italian campaign. Pitt was prime minister of England at twenty-five. Alexander Hamilton, famous as a financier, was hardly thirty when Burr killed him. Sheridan wrote the Rivals at the age of nineteen and Shakespeare was dead at fifty-two. Grant was only thirty-nine at the outbreak of the Civil war. It is no new thing therefore for young men to occupy high places. But their activity has been brought prominent of late by the diversity of high places occupied by them. Mr. Schwab steps out of the Steel Corporation at forty, and Mr. Corey steps in at thirty-seven. Mr. Dinkey follows Mr. Corey as president of the Steel Corporation at thirty-six. Mr. Schwab's career has put an emphasis upon the fact that the homely virtues are the ones which are most prized after all. It is reported of Mr. Corey that he is putting his whole soul into his work and is spending his days and nights solving the problems of management. Mr. A. C. Dinkey, too, is traveling the same hard road. He is a practical man. His whole training has been in practical lines. He was first of all a telegraph operator at the Edgar Thomson Steel Works. Later he learned the machinist trade in the Pittsburg Locomotive Works. Then he endeavored to introduce the arc light commercially into Pittsburg, returning to the Carnegie company as a clerk in the Homestead Steel Works. Conceiving the possibilities of electricity in rolling mills he sought a position in the steel works and perfected appliances to drive the rolls of the feed tables, dispensing with hooks and tongs and much hand labor. He was the first to introduce electrical cranes in rolling mills and assisted in the development of the electrical charging machine. He is also the inventor of an electrical controller bearing his name. In 1898 he was appointed assistant general superintendent of the Homestead Steel Works and in 1901 he succeeded Mr. Corey as superintendent. He now succeeds to the presidency of the Carnegie Steel Co.

Mr. A. C. Dinkey.

NEW PASSENGER STEAMER FOR LAKE MICHIGAN.

The Northern Michigan Line of Chicago has just given contract to the American Ship Building Co. for a new passenger steamer for the Chicago-Cheboygan run. She is to come out at the opening of the passenger season next spring. The new steamer will be 275 ft. long, 40 ft. beam and 18 ft. deep. She will have triple-expansion engines with cylinders 22, 35 and 58 in. in diameter with stroke of 40 in. Steam will be supplied by two Scotch boilers 12 ft. long and 14½ ft. diameter, allowed a pressure of 180 lbs.

There will be a double tier of state rooms fitted in curly birch and mahogany and all will open out to the side of the steamer. Hot and cold water will be provided in every stateroom. All the minor machinery of the steamer will be operated by electricity, including an electric elevator between decks to expedite the handling of freight. She will have an excursion capacity of 2,500 persons and will cost complete $285,000.

Secretary of the Navy Moody will ask congress at its next session to appropriate money for the construction of several scouts, one or two of which he proposes to attach to every large squadron of the navy. In the opinion of members of the naval board of construction lightly armored, speedy scouts of about 5,000 tons displacement are greatly needed. The bureau of construction and repair has for several months been experimenting with various models in the model tank and believes that it has now secured a satisfactory design.

Lieut. Com'dr Francis O. Davenport, United States navy, retired, died at Detroit last week of heart failure. He was appointed to the naval academy at Annapolis from Detroit in 1856 and graduated in 1860, being a classmate of Admiral Schley. He served in various vessels during the civil war and in 1870 was retired at his own request. He was deprived of his right arm during the war by the accidental discharge of a pistol. He commanded the gunboat Michigan on the great lakes in 1866-7.

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CHICAGO GRAIN SITUATION.

Chicago, Aug. 26.—The steady west-bound movement of coal through Lake Michigan ports keeps the vessel supply fully up to the moderate demand that prevails in grain shipping circles. There is little pressure either way, the market turning on a basis of 1@1⅛ cents corn and about 1 cent oats to Buffalo, Port Huron and Georgian bay. Today's chartering is at 1 cent corn and it would seem that this rate will hold through the present week.

Of the shipments noted for the week just closed (as below) the rail lines took some 500,000 bu. oats and 200,000 bu. wheat and corn; Canadian points (via lake), about 560,000 bu. of oats and some 600,000 bu. wheat and corn, with the balance directed for Buffalo. The shipments, lake and rail, together with stocks of grain, follow:

	Week just closed.	Last week	Same week last year.
Wheat, bu.	417,420	269,135	1,704,962
Corn, bu.	1,907,797	1,456,428	1,645,813
Oats, bu.	1,939,188	1,310,392	1,382,744
Total	4,264,405	3,035,955	4,733,519
	Since Jan. 1, 1903.		Same time last year.
Wheat, bu.	12,913,607		19,793,968
Corn, bu.	52,008,386		26,646,851
Oats, bu.	42,558,090		35,526,774
Rye, bu.	322,778		1,483,433
Total	107,802,861		83,451,026

Stocks of grain show some falling off for the week, but they are very much in excess of stocks a year ago. The figures are:

	Week just closed.	Last week.	Same week last year.
Wheat, bu.	5,328,000	4,940,000	5,644,000
Corn, bu.	4,713,000	5,842,000	2,218,000
Oats, bu.	4,817,000	4,607,000	1,625,000
Rye, bu.	462,000	375,000	170,000
Total	15,320,000	15,824,000	9,657,000

TESTS OF FALLS STAYBOLT IRON.

Recent tests of Falls hollow and solid staybolt iron, both of which are used extensively in marine and locomotive boilers, have given great satisfaction to the manufacturers, the Falls Hollow Staybolt Co. of Cuyahoga Falls, O. The first of the tests was made at the Grand Trunk Railway shops, Montreal. This was a vibrating test, as near as possible to the strains in a boiler, but much severer, to discover which make of iron would endure the strains longest, without breaking, and to learn the number of vibrations at thirty-two per minute each of the several makes of staybolt iron would endure. The results were as follows:

	Size, in.	Duration, minutes.	Broke on vibrations.
Falls hollow charcoal iron	1	157	5,024
Falls solid charcoal iron	1	131	4,192
Scully iron	⅞	120	3,840
Waverly special iron	1	95	3,040
Taylor iron	1	75	2,400
Tenness C. C. bloom iron	1	75	2,400

The actual duration of the Falls hollow charcoal iron was 161 minutes, equal to 5,152 vibrations, but the resistant strength of the sample caused intermittent attention by the tester with wooden wedges to keep the sample taut, and for this 4 minutes was deducted.

The other tests which were of Falls iron alone, were made at the McGill University, Montreal, and the results were:

	Solid piece.	Hollow piece.
Dimensions in inches	1	1
Yield point in pounds per square inch	33,790	27,252
Ultimate strength in pounds per square inch	50,150	48,420
Per cent. of elongation in 8 in.	29.3	32.5
Per cent. of reduction of area	56.4	53.7

"These tests," says one of the officials of the Falls company, "indicate so clearly the superior and uniform quality of our iron that they are proving of great value to us. Our trade is rapidly increasing in consequence of the high quality of this iron, both with railway companies and marine boiler manufacturers, and our plant is all the time crowded to keep pace with orders."

WINDLASSES FOR SOUTH AMERICA.

The Marine Journal of New York refers to the shipment from that port a few days ago of seven windlasses for the Amazon river, South America. "The windlasses were made," the Journal says, "by the American Ship Windlass Co. of Providence, R. I., for the Lidgerwood Manufacturing Co. of New York, who have a contract to furnish machinery to do the work of landing merchandise and loading cargoes of rubber on pontoons some distance from the shore in consequence of shoal water. The windlasses are worked by hand and are used to hold the pontoons in place, having a holding force of 20 tons, so that a trolley can be constructed from the pontoons to the shore, over which cargoes will pass. The windlasses have been ordered to replace others of English manufacture, which require a large number of natives to work them, while the American machines, it is claimed, can be easily operated by three men. The order was executed with the usual dispatch which obtains at the works of the American Ship Windlass Co. Six weeks from the time the order was received the seven windlasses, weighing over 80,000 lbs., were at New York ready for shipment to South America. Designing special machines for special work where the saving of labor counts is the constant aim of this old-established windlass company. All of their latest designs of windlasses are built to add some little improvement that the previous ones have suggested, and so it is also with their towing machines. Each new manufacture has some new idea attached to it to increase its efficiency and save labor, hence it is that the Providence automatic riding windlass, the Shaw & Speigle towing machines, the Winter wharf drop, the Providence chain stopper, and their many other specialties are being improved continually and this constant advance in the superiority of their manufactures is the cause of the forty-five years' continued success of the company in the United States and the gradual but permanent introduction of their machines abroad."

LIVERPOOL AFTER COTTON TRADE.

The annual report of the chairman of the Manchester Ship-Canal Co., John K. Bythell, which has just reached this country, refers to an effort which is being made by Liverpool ship owners to attract the shipment of American cotton away from Manchester. They have secured contracts in many instances subject to the condition that the freight rate should be the same, whether final delivery was made in Liverpool or in Manchester. The difference of six or seven shillings per ton in dues and rates between Liverpool and Manchester yields a substantial profit in persuading consignees to accept delivery at Liverpool. The effect of this practice, if persisted in, would not only be to rob the canal of a large part of its tonnage but also to make the Manchester market still more subordinate to that of Liverpool. The Federation of Master Cotton Spinners' Associations and the Manchester Cotton Association have taken the matter up and vigorously protested.

The report refers to the decline in the North Atlantic shipping and says: "Many of the large cargo liners usually plying to Liverpool from America are still laid up and those that have been kept on the lines have very frequently come in with only part cargoes." Notwithstanding this, the canal has actually had a small increase in tonnage from American ports during the last six months. Regarding the relations of the company with American shippers, the chairman says:

"While we are not neglecting in the least degree any branch of trade, we are at the present time giving a good deal of attention to the United States and Canadian trades because we know their great capabilities. Our chief traffic superintendent, Mr. Gibson, has been in America for some weeks. He is sailing back again tomorrow. He has been visiting railway companies, steamer owners and agents, merchants and manufacturers, with a view of trying to secure for us an increased trade, especially during the coming season. I am convinced myself from what I know that his visit will be productive of good. He has been very well received everywhere by leading men, and I think we shall see the results during the next season. The importance of that trade it is impossible to overrate; and as I have already said, we feel quite justified in making this special effort with America, though I assure you we have not been neglecting other work, and we are looking well after every trade."

The report of earnings for the half year ended June 30, show gross earnings of £180,422 and net earnings of £75,876, an increase of £15,505 over the corresponding period of the previous year.

The annual meeting of the Lake Superior Mining Institute was held last week at Ishpeming, Mich. The opportunity was seized by the members to visit the mines of the Marquette range and to pretty generally inspect the properties of the Cleveland-Cliffs Iron Co., which has branched out wonderfully during the past three years. Especially interesting was the visit to Grand island, which has been converted into a game preserve by the Cleveland-Cliffs company. The group of industries established at the Sault by the Consolidated Lake Superior Co. was also inspected. The following officers were elected: President, G. H. Abeel, Hurley, Wis.; vice-presidents, J. H. McLean of Ironwood, Mich.; and J. B. Cooper of South Lake, Linden, Mich.; secretary, A. J. Yungbluth, Ishpeming, Mich.; treasurer, E. W. Hopkins, Commonwealth, Wis.; managers, John McDowell of Hibbing, Minn., and W. J. Richards of Crystal Falls, Mich.

Receipts of anthracite coal at Chicago by lake thus far this season has been in excess of the normal movement. The total receipts of anthracite by lake at Chicago and South Chicago, beginning with the first cargo, April 18, to Aug. 24, reached 637,441 tons, compared with 175,076 during the same period in last year, while the strike prevailed, and 877,240 tons for the full year of 1901. Out of a total of 282 cargoes of coal received at Chicago and South Chicago, 237 were unloaded in the Chicago river. The largest of these was 4,250 tons, brought in by the steamer Chili. At South Chicago the record for the season stands at 7,200 tons, that cargo having been delivered by the steamer Walter Scranton.

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ENGINEERING IN THE NAVY.*

By Ira N. Hollis.

The importance of engineering to modern navies is no longer a debatable question. Sails have disappeared and a new propelling power has taken their place so completely that soon there will be few officers of our service, or of any other service, who have had any extended experience with ships under sail. Furthermore, within a generation there will be hardly any necessity for such experience. This change from one motive power to another, and, in much of the daily work of the ship from man power to electrical or steam power, is certain to modify radically the point of view of the future naval officer. He will regard that part of the navy connected with the organization and management of ships from a different standpoint.

An historical parallel between the state of the British navy of the fifteenth and sixteenth centuries and the American navy during the past fifty years, offers in this connection much that is instructive to naval officers. Both periods saw the disappearance of an organization not adapted to contemporaneous conditions; both closed in a struggle with Spain over colonies in America, and both, for similar reasons, disclosed the woeful weakness of Spanish sea power. The series of books on the British navy published by the Navy Record Society have placed before the general reader much information not hitherto accessible, and among these volumes none is more interesting than that by Sir William Monson. He wrote a number of tracts on the state of the navy, and one of them sheds a light not only on the organization for sailing vessels during the Elizabethan period, but it also, by comparison, furnishes food for thought about the future development of modern navies. That part of the tract which relates to the manning and organization of ships for opposing the Spanish Armada is particularly apt. The history of the decline of Spain's sea power does not seem to have received the consideration it deserved from the point of view of the personnel; and few outside of the navy understand that when the ships of Spain and England met in 1588 it was a meeting between two different systems, one modern, for that period, and the other antiquated.

Naval warfare, up to the time of Drake and Hawkins, was conducted on the lines of land warfare, and the ideas of a campaign were similar in both cases. This followed from the fact that the men who commanded the ships had been educated to fight on land. Those who bore armor could not man the oars or the sails of the ship, and their point of view was essentially that of landsmen, hence there was a distinct line of cleavage between the sailors, who navigated and sailed the ships, and the soldiers, who fought. Naturally the latter commanded and bore with them the traditions of their own service. They were not seamen, and they possessed little knowledge of the sea. The development of effective fighting ships was consequently slow, and the true elements of sea power were not thought of, much less understood.

The great voyages of adventure which followed the discovery of the new world bred up a race of seamen fitted to command and to take over from the army the fighting as well as the navigating of ships, and the English were not slow to grasp the advantage to be gained not only from their employment, but from the homogeneity of the crews which would follow when sailors manned the guns as well as the sails. The influence of heavy guns in accelerating this movement was important, but improvements were slow, and two centuries were required to work a complete change in the personnel. During the latter part of the sixteenth century England passed through a period of reform, especially in the training of officers. Soldiers who could not learn seamanship were eliminated, and their places were taken by men whose previous education and experience had been with the sea and with sails which formed the propelling power. So far as possible all officers and men were taught to be generally useful on board ship, and there must have been a strong incentive to acquire skill in all the details which related to sails and rigging. Sir William Monson's statement of the case is so clear that a few brief paragraphs are well worth quoting, at the risk of repeating to naval officers much that they know already. He says:

A SIXTEENTH CENTURY TALE.

"The experienced valiant sea-soldier and mariner, who knows how to manage a ship and maintain a sea-fight judicially, for defence of himself and offence of his enemy, is only fit to be a captain or commander at sea; for without good experience a man otherwise courageous may soon destroy himself and his company. The sea language is not soon learned, much less understood, being only proper to him that has served his apprenticeship. Besides that, a boisterous sea and stormy weather will make a man, not bred on it so sick, that it bereaves him of legs, stomach, and courage, so much as to fight with his meat. And in such weather, when he hears the seamen cry starboard or port, or to bide aloof, or flat a sheet, or haul home a cluling, he thinks he hears a barbarous speech, which he conceives not the meaning of. Suppose the best and ablest-bred seaman should buckle on armor and mount a courageous great horse, and so undertake the leading of a troop of horse, he would no doubt be accounted very indiscreet, and men would judge he could perform but very weak service; neither could his soldiers hope of good security, being under an ignorant captain, that knows not scarce how to rein his horse, much less to take advantage for execution or retreat; and yet it is apparent to be far more easy to attain experience for land service than on the sea. The seaman's desire is to be commanded by those that understand their labor, laws and customs, thereby expecting reward or punishment according to their deserts. The seamen are stubborn or perverse when they receive their command from the ignorant in the discipline of the sea, who cannot speak to them in their own language. That commander who is bred a seaman, and of approved government, by his skill in choice of his company, will save twenty to the hundred, and perform better service than he can possibly do that understands not perfectly how to direct the officers under him.

"The best ships of war in the known world have been commanded by captains bred seamen; and merchants put their whole confidence in the fidelity and ability of seamen to carry their ships and goods through the hazard of pirates, men-of-war, and the danger of rocks and sands, be they of never so much value; which they would never do under the charge of a gentleman, or an unexperienced soldier for his valor only. The United Provinces, whose safety and wealth depend chiefly upon their sea affairs, and who for some years past have had great employment, and enlarged their dominions much in remote places, use only their expert seamen to go captains and chief commanders in all their ships of war and trade. The Spaniards have more officers in their ships than we. They have a captain in their ship, a captain for their gunners, and as many captains as there are companies of soldiers, and above all, they have a commander in the nature of a colonel above the rest. This breeds a great confusion, and is many times the cause of mutinies among them. They brawl and fight commonly aboard their ships as if they were ashore. Notwithstanding the necessity they have of sailors, there is no nation less respectful of them than the Spaniards, which is the principal cause of their want of them; and till Spain alters this course, let them never think to be well served at sea. I have heard divers sufficient men, as merchants and others that lived in Spain, before the wars with Queen Elizabeth, very much cry down the king of Spain's ships in comparison of ours; as in particular that they were huge and mighty in burthen, weak and ill-fashioned in building, lame and slow in sailing, fitter for merchandise than war; and I remember that old seamen, as Sir John Hawkins and others, have maintained that one of her majesty's ships was able to beat four of them. I confess we may the rather believe it, because the event has showed it; for if we examine the particular loss on both sides, her majesty's ships have devoured divers of the king of Spain's; whereas there was but only one of hers taken, and that merely by the indiscretion of Capt. Sir Richard Greenville; for which one there have been burnt, sunk, and taken twice, as many as the queen has in number, insomuch that if the queen's loss had equalled the king of Spain's, she could hardly have maintained her navy in that flourishing state it is in. But if we should attribute these misfortunes to ships, which are made all of one sort of wood and iron, and after one manner of building, it were great folly; but give Cæsar his due, and allow the ships their due, for a ship is but an engine of force, used for offence or defence, and when you speak of the strength of ships you must speak of the sufficiency of men within her; and therefore, in comparing the Spanish ships with ours I enter into the comparison of men; for if it were in my choice I rather desire a reasonable ship of the king of Spain manned with Englishmen than a very good ship of her majesty with Spaniards; so much account I make betwixt the one and the other."

This tells the whole story of the failure of the Armada. Spain was not up to the times. Her men were not familiar with their ships, and they were pitted against seamen trained to handle well the materials placed in their hands. During the past fifty years history has seemed to repeat itself, and the same change has been taking place in the British navy. It has only recently culminated in a complete reorganization of the personnel to fit modern conditions, involving precisely the same kind of a readjustment that took place three centuries before. Substitute modern equivalents in engineering for the corresponding technical words in Sir William Monson's paper, and we should have almost a modern essay on the cause of American triumph over Spain. Our change had begun earlier by the introduction of engineering at the naval academy, and in the elimination of subjects unnecessary as belonging to the past, until we had practically an engineering school. Our ships had been gradually organized to promote the highest efficiency of engineering, so that when we met the Spanish ships on which the officers seemed either to have a contempt for technical engineering matters or no understanding of them, we achieved exactly the same results that the English had accomplished 300 years before. We found a navy not up to the times, and the result was inevitable from the first.

FUNDAMENTAL NOTE MUST BE ENGINEERING.

In the new organization of the English navy, which has moved very much along the lines begun in the American navy twenty-three years ago, we find that every officer must enter the service upon the same terms and be prepared after seven years to take a commission in the line, marine corps or the engineer corps. All must learn a large amount of engineering, therefore, before receiving a commission. In the personnel bill which passed congress we have gone further, and have required that all officers shall be engineers as well as deck officers. The fundamental note in both services must inevitably become engineering, as that of the past has been seamanship. Yet the latter word cannot be lost so long as men go to sea.

It may be useful here to give the ordinarily accepted definition of both words as a means of making clear their exact rela-

*Address delivered before the Naval War College.

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tion to each other. Engineering is the art of constructing engines or machines, the art of executing civil or military work which requires a special knowledge or use of machinery or the principles of mechanics. Seamanship is an acquaintance with the art of managing and navigating a ship at sea. It is difficult to decide which of these two words includes the other when applied to the naval service. In a battleship both involve the handling and training of bodies of men. Perhaps, since a battleship can be managed only by means of machinery, engineering is legitimately a branch of seamanship. It is a branch of overwhelming importance; but, nevertheless, there are many other things besides the management of a ship involved in seamanship. A knowledge of the sea and of storms might very properly be classified as seamanship. Still, engineering, as involving the motive power, the guns and the technical qualities of the ship, is the chief thing to be studied.

During the discussion of the personnel bill one of the advocates of the bill referred to the future naval officer as a fighting engineer, and in many senses the description is a correct one, for engineering must necessarily be the motive, or the foundation, upon which the education of a future naval officer is built up. The change recognizing this fact has already taken place at the naval academy. The personnel bill, therefore, came as a final settlement of a struggle which had marked the transition from sails to machinery. It formed a clear dividing line between a ship which could keep the sea for an indefinite period and one which had only a steaming radius dependent upon the coal supply. The old type had lasted for about four centuries, having succeeded still another kind of vessel which had a radius dependent upon the muscular power of rowers. In some respects coal endurance is similar to muscular endurance; both may become exhausted, and both are limited to definite distances from the home base. Whatever naval officers or civilians may think of the merits of the personnel bill, nothing can ever carry us back to the old regime which prevailed in the unsatisfactory union of sails and steam within the same vessel. The change from one type to another was therefore necessarily accompanied by a change in the education of officers and men, in the organization, and even in the strategy and tactics adopted in the time of war. One of the most important problems which our service has to solve today is the relation of the present engineering to all three of these points.

It is difficult to write on engineering in the navy without repeating much that has already been said. Every officer knows that the modern battleship is directed in almost every detail by machinery, and that the organization must be such as to secure the highest efficiency of the machines. Some are used for moving the ship as a whole, some for handling the guns and turrets, and some for the numerous auxiliary purposes connected with the comfort and convenience of the crew. Few can be spared, and in many cases a single weak element would jeopard the safety of the entire ship's company. To the end that every machine, including the guns which, after all, are but special types of machinery, shall perform the function allotted to it in its original design, every man must be well trained in the care and use of machines or boilers. The responsibility of this training falls upon the commanding officer, who must therefore have an intelligent understanding of every element which affects the efficiency of his ship; otherwise he cannot do his whole duty without undue effort and anxiety.

It is not sufficient that a man should have common sense and experience of the sea in order to enable him to take good care of a battleship. He may be able to carry her out of port and to bring her back again. He may have a good knowledge of international law, and therefore be able to serve the nation well in diplomacy. He may, furthermore, be able to discipline his crew; but in the test of a long war, where preparation and care of machinery are bound to count in success or failure, he is badly handicapped if he does not know from personal experience all the details of his ship. His early education must, therefore, have been related to the material problems of his command, and his experience must have been such as to fix definitely what he has learned at school.

NAVAL ACADEMY IS NOW A SCHOOL OF ENGINEERING.

The naval academy is no longer a school of seamanship, unless we define seamanship in a very broad sense, but is essentially a school of engineering, where all the fundamental subjects are such as would be found in a good technical school. The course of study for all cadets today is along much the same lines as that given to cadet engineers twenty-nine years ago, only it is a better engineering course. Graduates can now fill engineers' positions in civil life quite as well as young men from technical and scientific schools. This seems not to be well understood even by the service, and its effect in modifying the entire personnel of the navy, as class after class graduates, cannot be estimated. Of one thing we may be sure, namely, that in the management of ships and in the great number of details connected with their design, their equipment and their organization, the engineering motive is bound to replace the traditions which formed themselves around the sails and the broadside guns of the old frigates. This has up to this time been recognized only in part by the navy, where the benefit of the personnel bill seems still open to argument.

My own correspondence and discussion with officers would lead me to say that there are two parties in the service; the larger has accepted the situation and the smaller is disposed to question seriously the whole change. In the eyes of the former the management of the navy under the new organization has been entirely successful, while the latter believe that a new engineer corps will be established within a comparatively short time. It seems to me that the personnel bill has not yet had a fair trial. While much has been done at the naval academy, the ordinary routine on board ship has not adapted itself to the continuation of the work done there, and the obvious intention of the bill has not been thoroughly carried out. One familiar with the navy knows perfectly well that there have been difficulties in the way. Every bureau has been clamoring for officers, and every corps has felt itself depleted during the past five years. We have had this great reorganization to carry out at a time of tremendous expansion in colonial interests and in ships. There have not been sufficient officers to go around, and therefore no branch of the service has had its work done to the best advantage. Nevertheless some method should have been found in the service to provide successors for the old engineer corps and for those skilled in engineering who are rapidly disappearing from the active list. Within ten years there will be few officers available for sea service who in the early years of their careers had responsible engineering duties.

It is not enough to detail a young graduate of the naval academy to receive instruction in the engine room; he must have responsible charge, and there is no reason why he should not be capable of taking it a few months after graduation. This should not be a question of the wishes of any individual, either subordinate or in command, but it should be the absolute requirement for a young officer's promotion. The theoretical objection that officers cannot alternate between the engine room and the deck all their lives, does not apply at all, as the personnel bill never contemplated anything of this kind. It did contemplate, however, that the care and running of machinery should be placed in the hands of officers of the line, and that, therefore, they must obtain experience early in their careers. Three years in the engine room is none too long, and these three years should be within the first six years out of the naval academy. After that, officers should be detailed according to their tastes and abilities.

In discussing the engineering question, officers commonly confuse the design and construction of machinery with its care and management in service. The two have no fixed, definite relation. The best designer of a gun, or of an engine, may not be a good man to manage it in actual service. For the work connected with design and, to a large extent, with repairs, a technical department of the line, or a separate technical corps, will be absolutely necessary, and there is nothing inconsistent with such a corps in the personnel bill. The intention of that bill was to end the strife in the navy and to force engineering into the daily duties of line officers. The hitch in the old organization was the total absence of inducement to study engineering, except in the engineer corps. So long as a new engineer corps is chosen from the line after officers have had sufficient experience to know their own tastes, the spirit of the new organization will be maintained. Furthermore, it is doubtful if there is anything in the statutes to prevent the secretary of the navy from detailing officers permanently to engineering duties, and thus, by administrative process, creating an engineer corps. The main difficulty in the way would be found in securing the willing cooperation of officers so detailed unless some inducement were held out.

NOT OPPOSED TO SPECIALIZATION.

When we consider the care and running of machinery, too much has been made of the phrases that "this is an age of specialization" and that the present scheme is "contrary to the genius of modern times." That is perfectly true so far as it goes, but on board ship a good officer is the specialist, and the more he knows about his ship the better for the service. As a matter of fact, there is no difficulty whatever in teaching a midshipman all the details on board ship if the opportunities are placed before him. With his grounding in engineering he is ready to take hold of anything and to learn the management of men besides. The fundamental fact to be kept before him at all times is that the care and adjustment of the machinery of a ship, from the propellers to the turrets, demand greater judgment and energy than running it. If a machine is in good order, pulling a lever ought to start it or stop it. Young officers should, therefore, have a large share in duties connected with repairing, cleaning and adjusting machinery and boilers, and too much emphasis cannot be placed on the fact that this share must be a responsible one.

There is danger that the service may drift into too great a dependence upon the warrant machinists, bringing up again within a few years another discussion similar to that which prevailed for thirty years after the civil war. This would be a most unfortunate condition of affairs, and all the work connected with organization would have to be done over again. What could have been thought of a system which turned the practical management of sails over to the warrant officers under the theory that the sails and rigging formed only one of the many details under the care of executive officers? The commanding officer would soon have found himself as much in the hands of warrant officers as were the soldiers who commanded before the reorganization of the British sailing navy, and as will be the officers of our service in case the machinery is allowed to fall back into the hands of officers without commissions. The opening of the warrant grades to machinists was intended to promote efficiency by giving them the same incentive already provided for the other enlisted men. It would be most unfortunate to have it used as a

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means of relieving line officers of watch duties below decks. No doubt there was good reason twenty years ago to question the wisdom of putting five or six highly educated engineers on board of a sailing vessel with auxiliary steam power to run engines of a few hundred horse power, but that is not the state of the navy today, and we must not forget that everything connected with the materials of a ship depends more or less directly upon the efficiency of machinery. The most important consideration cannot be allowed to drift back into one of secondary importance, as it could have been when vessels could keep the sea by means of their sail power.

When we consider the possibilities of a technical corps, we should find it difficult to make an argument against it, and it could not in any way decrease the effectiveness of the present reorganization, engineering being considered the motive underlying the education at the naval academy. In fact, a technical corps, or a technical department of the line, is almost a necessity, but the men for this department should be selected from the list of line officers, and they must have developed technical abilities. Because all officers have been educated alike, it does not follow that they are equal in the performance of duties, or that all will have the same tastes, and it would be a serious loss if the government could not take advantage of special talent of its commissioned officers. If this looks like specialization, it is the kind that selects men for the work that they are best fitted to do after they have demonstrated their fitness. Such specialization will not throw men out of touch with the executive duties of a ship, as the care and management of machinery demands the co-operation of a large number of enlisted men, who must be directed.

This kind of control on the part of the chief engineer and his subordinates involves the same class of executive work to be found on deck, and an officer whose principal occupation has been with machinery is not thereby crippled for executive duties. The old system of detailing men to three or four years' clerical work in the navy department or in the yards was far worse on the morale of the service than would be a long detail to engineering duty at sea or on shore. Far better that men should have been attending to construction and engineering matters on shore than that they should have been hanging over desks.

ALL THE CREW ARE BEHIND THE GUNS.

In the organization and training of the crew the problem is more difficult. The navy cannot keep in the service first-rate mechanics, as the rewards in civil life are too great. With few exceptions, therefore, we have to be content with men of the ordinary laboring class. By making their duties simple, and offering suitable rewards, they can be trained to do the work of a battleship admirably. These are matters, however, which experience must arrange for the naval service, and there is no reason to think that naval officers are not amply qualified to adjust them properly. Still, one of the phrases which has been worked to death in the interest of the men who customarily man the guns is "the man behind the gun." This phrase tends to set up a caste distinction in the service which has no existence in fact. It puts a premium on the spectacular, and tends to destroy the spirit of those men who do the work of preparation and who carry the gun into a position where it can be fired. Everyone knows that a battleship is built for her guns, and that she is nothing if not a first-rate gun carriage, but that does not entitle the men who stand in the turrets to the peculiar gratitude of the nation when compared with the men who tend water, hoist powder, or who handle the throttle valves of the engines. As a matter of fact, all the crew are behind the guns.

As a nation we are likely to go into hysterics over the spectacular and for the time being to lose sight of essentials. The great voyage of the Oregon from San Francisco to the Atlantic coast will probably live forever in the annals of our navy, and yet many other cases of fine service have entirely escaped the attention of people. Whoever speaks or cares anything about the exploit of the little Marietta that accompanied the Oregon? No one seems to have thought of her plight in case she had met the Spanish fleet in company with the Oregon. Her business was to go ahead and order coal and to act as a scout for the Oregon. She made the same voyage and with equal success, yet we have been so drilled to admire the spectacular that we forget her entirely. Furthermore, who thinks much about the voyage of the Monterey across the Pacific?—as fine a piece of seamanship as we have had in modern times. It is too often the actor in the middle of the stage who catches our attention, no matter whose lines he may be reciting.

All this is an important consideration in organizing the crew. Every man should have full recognition for good work, and it is especially important that technical skill should have its reward. I am convinced that the education of deck officers into a sympathetic understanding of the machinists, oilers and firemen will more than offset any deficiency that may arise from their lack of professional contact with the machinery.

In writing about organization we necessarily draw from a very limited experience with steam vessels in naval warfare. There has been no real test. The civil war gave us great experience in the conduct of a blockade, but none whatever in great fleet tactics. Our late war, although large in results, taught few lessons outside of technical considerations connected with the design of ships, and we have little upon which to pass a judgment of the future. Naval tactics and strategy may have as great a development under steam as they had under sails, given the presence of a great seaman engineer. Some writer has defined sea endurance as the essence of naval strategy, and steam power as the essence of naval tactics. This seems a clear and apt distinction which may well be kept in mind. They depend respectively upon the economical use of coal and the proper use of materials for handling a ship. Neither has received the attention its importance demands. Much can be done in studying the economical use of coal for our battleships and cruisers at high and low speeds, and the department could probably extend the steaming radius of every ship by the careful elimination of unessentials, and a more careful study of every type of ship.

The only great lesson taught by the Spanish war is the enormous advantage of adequate preparation. We already knew that. No officer in the navy had the slightest doubt about the ultimate outcome of the war, even from the day of its declaration, and for probably the same reason that would have governed his judgment of the great Armada. The Spaniards were as much behind the times of 1898 as they were in 1588, and their antagonists were as much ahead. Nevertheless, we now bid fair to drift, having accomplished a great reform under conditions which have led the greatest navy in the world to copy us. We do not yet seem to realize our opportunities and duties.

Naval warfare of the future cannot possibly be a matter of long campaigns. A great fleet action will be short and sharp, and few or none of the defeated ships are likely to escape. Maneuvering for the weather gauge will be replaced by the long and tedious preparation of bringing every ship up to the supreme test of one great effort, and by the attempt to get between an enemy's fleet and his coal pile.

The future of our navy is fortunately in the hands of men with a natural aptitude for mechanics and engineering, and in this period of transition we have the advantage of no real lack of harmony to prevent an efficient organization. The country owes much to the patience and courage of the older officers who were educated under a system which has already disappeared. Upon their shoulders have been thrust some very heavy burdens. Men advanced in life cannot easily learn new ways, and yet our officers have risen to the demands of a new service with admirable courage. Instead of repining over the unsatisfactory settlement of a great question, the entire navy ought to rejoice that so few mistakes have been made, thus giving positive evidence that the service will be equal to the occasion. The main point under consideration here is that we should not wait too long to provide successors for a fast disappearing corps.

CHICAGO SAND RAMMER.

Among labor-saving tools which the Chicago Pnuematic Tool Co., Fisher building, Chicago, has lately placed on the market, special attention is directed to one, known as the Chicago sand rammer, and illustrated herewith. The Chicago company says of this tool:

"The Chicago sand rammer is a device which we have just placed on the market, and results have been highly satisfactory, the machine showing up to very good advantage wherever used.

"In connection with its light weight, one very advantageous feature, which will be noted from the illustration, is that this machine can be operated by a man standing up, thereby eliminating the necessity of continually bending over, a fatiguing task necessary to the operation of similar types of machines now on the market. This feature we are confident will appeal very strongly to users of sand rammers.

"The following are the principal features of the rammer: Diameter of piston, 1 1-16 in.; stroke of piston, 7 in.; cubic feet of free air consumption at 80 lbs. pressure, 30; number of blows per minute at 80 lbs. pressure, 500; weight, 17 lbs.

Chicago Sand Rammer.

"This machine is certainly the most satisfactory and practical rammer ever placed on the market, and its many advantageous features cannot fail to appeal strongly to users, if properly brought to their attention."

To keep pace with the growth of trade on the St. Lawrence route to Europe the Allan Line has placed an order for a new passenger steamer with Workman, Clark & Co. of Belfast, Ireland. The new vessel will be 545 ft. long, 60 ft. beam and 43 ft. deep and will be of 11,000 tons burden. She will have twin screws and a guaranteed speed of 18 knots per hour. The contract calls for delivery next August.

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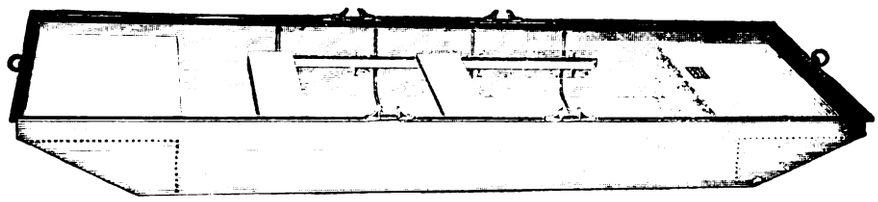
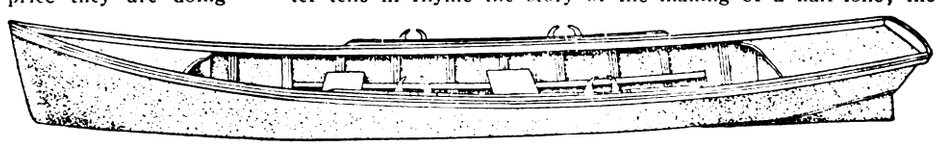
RIPPLEY LIFE BOATS AND SKIFFS.

The accompanying illustrations show two of the many life boats that are being manufactured by the Rippley Hardware Co., Grafton, Ill. This firm is doing considerable business in life and pleasure boats. Their life boats and skiffs are made of No. 18 galvanized steel, are fitted with angle steel ribs, air chambers at each end, and as they have no parts to warp or shrink they will last for many years. Commendatory letters concerning these boats have been received by the company from government officials. Prices and circulars will be sent to any one upon request. The company is justly proud of its reputation as builders of these lesser craft. They claim, considering the workmanship, to have the cheapest boat on the market, and as they are satisfied with a reasonable price they are doing a thriving business. There is no end to the delight which can be got out of a small skiff in fishing or hunting or any pleasure pursuit and it is especially satisfying to know that the little craft is built to stand much buffeting and to ride well in a sea. While these boats are reasonable in price seaworthiness is not sacrificed.





As an indication of the extent of sale for these boats, the following extract is made from a letter to the Rippley company from John L. Miens of the St. Louis Transit Co., St. Louis, Mo.: "Please get out for us at once a dozen more of the 14-ft. boats. In shipping them send four at a time to save expense of teaming them. H. A. Stevens of No. 3516 Page avenue, St. Louis, tends the boats. He is very much pleased with those received from you. He has had twenty-five years' experience on the lake with a fleet of boats numbering 100 and you will undoubtedly receive valuable information from him."

TRADE NOTES.

The Atlantic Works Incorporated of Philadelphia has just shipped one of its B-17 adjustable bevel band saw machines for ship yard work to Messrs. E. Diebert & Bros., Elkton, Md.

It is interesting to note that a portion of the snap hooks used on the cup defender Reliance were furnished by the Delaware Marine Supply Manfg. Co. of Wilmington, Del., whose specialties in the marine line are rapidly gaining for them a most enviable reputation. These hooks were patented on Oct. 28, 1902, by Capt. J. M. Into of Bristol, R. I., and the fact that Capt. Chas. Barr is using them on the cup defender is evidence of their worth.

The Eclipse Electrotpye & Engraving Co. of Cleveland have reason to be proud of their book entitled "Shop Rhymes." It is an entirely original thing and it is doubtful if a better bit of engraving and printing has been turned out this year—at any rate none better has come into this office. The letter-press matter tells in rhyme the story of the making of a half-tone; the pictures illustrate the various processes through which the engraving has to go. The rhymes are not doggerel by an means, but are of excellent literary quality and the illustrations are splendid examples of wash drawings. They are printed upon tone blocks in brown and the effect is especially rich.

A prime requisite in successful business of today is to make quick deliveries, and the "when" is often considered of more importance than the "how much." To further facilitate the prompt filling of orders, the Sawyer-Man Electric Co. recently established a distribution depot at the central stores of the terminal warehouse, West Twenty-Eighth street, New York. Here are kept over a million lamps in stock, so that any and all calls may be speedily and completely answered. A similar depot is situated at Thirtieth and Market streets, Philadelphia, and others in Boston, Buffalo, Syracuse, Pittsburg, Charlotte, Chicago, Denver, St. Louis, Atlanta, New Orleans, San Francisco, Seattle and other centers of trade.

Mr. James Ross has resigned as president of the Dominion Iron & Steel Co. and Mr. J. H. Plummer, vice-president, has been made managing director. Mr. Ross still remains at the head of the Dominion Coal Co.

BELLEVILLE WATER-TUBE BOILERS

NOW IN USE (FEBRUARY, 1903)

On Board Sea-going Vessels, NOT INCLUDING New Installations Building or Erecting.

French Navy	276,460 H. P.
English Royal Navy	849,300 "
Russian Imperial Navy	193,900 "
Japanese Imperial Navy	122,700 "
Austrian Imperial Navy	32,900 "
Italian Royal Navy	13,500 "
Chilian Navy	26,500 "
Argentine Navy	13,000 "
The "Messageries Maritimes" Company	87,600 "
Chemins de fer de l'Ouest: (The French Western Railway Co.) Steamships plying between Dieppe and Newhaven	18,500 "
Total Horse Power of Boilers in Use	1,634,360

DELAUNAY BELLEVILLE CO.—Incorporated

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OUR BRITISH INDIAN LOSS.

Editor Marine Review:—British India imports over $250,000,000 worth of goods annually, of which the share of the United States is only 1.5 per cent. About 36 per cent. of the imports is cotton goods—a specialty of ours—and the next largest item is manufactures of iron and steel, another specialty of ours. What is the trouble? Want of ocean steamships. Until recently we could ship direct by the Bucknall Line, though at irregular intervals, calling at many ports and taking about fifty days for the passage. That line has been withdrawn, and now the only way to ship American goods from New York to Calcutta is via Glasgow, Liverpool, London, or Naples. Goods shipped by these routes are often very much delayed waiting transhipment. As Consul-General Patterson of Calcutta says—"if a direct line of steamships was established between New York and Calcutta, sailing regularly—not less than once every month—the passage should not be more than forty days, so that importers could rely upon receiving their goods at specified times, and if our exporters would regularly send capable men to exploit the markets of India our trade would be increased manyfold within a short time." One thing is certain and that is that if a line of American ships was plying regularly between New York and the principal ports of India, or even the one port, Calcutta, American exporters would send more American salesmen into the populous markets of India. The travel of American salesmen always results in new business or increased business. All we need is direct rapid transit and more determined effort to sell. Give us the one—and the other will follow. We have the raw materials, we have the factories, we have the work people, and we can and we do make the goods. There are no restriction on trade in India and there is, as Consul-General Patterson further says, "no reason why American exporters should not compete successfully with those of the United Kingdom, especially in cotton goods and all manufactures of iron and steel."

Besides the benefits to be derived from increased exports by American ship builders and their workmen, American manufacturers and their workmen, American exporters and their salesmen and help generally, American ship owners and sailors, there are further benefits for each in the return cargoes. Our imports from India are large and increasing, amounting to about $35,000,000 last year. Going through the list of India's imports shows that fully three-fourths are of classes of articles successfully produced and exported from the United States, yet, as before stated, our total exports to India only form 1.5 per cent. of India's total imports.

We must note that, by no means, has India yet reached her growth in imports and exports. In imports the growth has been from $28,000,000 in 1840 to $264,000,000 in 1902. In exports, from $51,000,000 in 1840 to $403,000,000 in 1902. Her total foreign commerce of 1902, namely, $667,000,000, was distributed as follows: Great Britain, 70 per cent.; Austria Hungary, 4.8 per cent.; Russia, 3.9 per cent.; Germany, 3.7 per cent.; Belgium, 3.7 per cent.; China, 2.2 per cent.; France, 1.7 per cent.; United States, 1.5 per cent.

We ought not to be at the tail-end of this list, especially as we took 6.9 per cent. of India's exports. If we could even work our sales to India up to only a balancing trade, it would be some satisfaction. As carriers of India's commerce Great Britain figures for 81 per cent., while our share is not worth figuring.

WALTER J. BALLARD.

Schenectady, N. Y., Aug. 25, 1903.

FAVORABLE SHOWING FOR BELLEVILLE BOILERS.

Results of official trials of several vessels of the French navy, fitted with the most recent improved type of Belleville boiler are now at hand. The following tables give the results of the official trials:

French cruiser Devastation, 8,300 H. P. Comparison between the trials of this ship in 1879 when fitted with cylindrical boilers and in 1903 when fitted with the most recent type of Belleville boilers (1902 model) with economizers:

	1879. Cylindrical boilers.	1903. Belleville boilers.
Trial at 1,390 H. P.:—		
Indicated horse power	1,390	1,413.3
Coal burnt per horse power per hour	2.71 lbs.	1.68 lbs.
Trial at 6,000 H. P.:—		
Indicated horse power	6,000	6,534.5
Coal burnt per horse power per hour	2.27 lbs.	1.90 lbs.
Trial at 8,000 H. P.:—		
Indicated horse power	8,000	8,856
Coal burnt per horse power per hour	2.76 lbs.	1.85 lbs.

Results of official trials of the French cruiser Dupleix, 17,100 H. P., fitted with the 1902 type of Belleville boiler:

Duration of trial,	6 hours.	6 hours.	6 hours.	3 hours.
Revolutions per minute	72.4	87	133.16	143.13
Indicated horse power	1,614.8	3,921	12,745.6	17,979.9
Consumption per indicated horse power per hour	1.52 lbs.	1.53 lbs.	1.67 lbs.	1.75 lbs.
Speed in knots per hour	6.514	13.483	—	20.9

Results of official trials of the French armored cruiser Marseillaise, 20,500 H. P. fitted with the 1902 type of Belleville boilers:

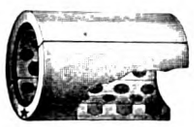
Duration of trial,	6 hours.	24 hours.	6 hours.
Revolutions per minute	76.6	111	118
Indicated horse power	1,904	10,658	14,593.6
Consumption per indicated horse power per hour	1.31 lbs.	1.43 lbs.	1.53 lbs.
Speed in knots per hour	9.697	18.5	19.543

Results of official trials of the French armored cruiser Sully, 20,500 H. P., fitted with the 1902 type of Belleville boilers:

Duration of trial,	6 hours.	24 hours.	6 hours.	5 hours.	3 hours.
Revolutions per minute	78.86	112.13	122	134	142
Indicated horse power	2,066	10,340.81	14,110	15,284	20,342
Consumption per indicated horse power per hour	1.19 lbs.	1.39 lbs.	1.49 lbs.	1.57 lbs.	1.86 lbs.
Speed in knots per hour	9.9	18.4	19.5	20.6	21.4

An order for a large passenger steamer for the Allan Line's St. Lawrence-European service has been placed with Workman, Clark & Co. of Belfast, Ireland. The vessel will be 545 ft. long, 60 ft. beam and 43 ft. depth and will be of 11,000 tons. She will have twin screws and will have a guaranteed speed of 16 knots. The contract calls for delivery next August. Her cost will be $800,000.

The Richelieu & Ontario Navigation Co. has definitely decided to build a new steamer for the passenger trade between Montreal and Quebec. Work will be started shortly on the vessel which is expected to cost $400,000.



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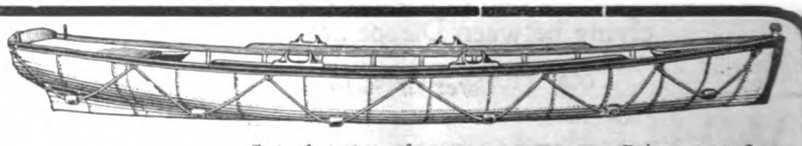

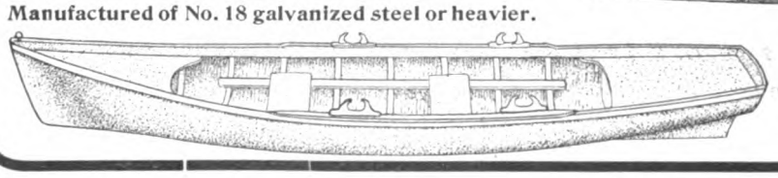

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SEEN AND HEARD ON THE LOOKOUT.

A short while ago there appeared in a Boston paper the following advertisement: "Visit Europe and be in style; $5 and free return ticket." Upon investigation it was found that the advertisement was inserted by a facetious individual who wished to hire men to feed cattle that were intended for exportation. While not knowing how many, if any, men were sufficiently desirous to be considered stylists to close with this offer, it cannot be denied that this certainly was an economical way of visiting Europe and preferable to stowing away. Upon the arrival on this side of one of these large steamers often referred to as western-ocean greyhounds, one ever reads with slight variations, the following description of her load of human freight: "After an uneventful voyage the steamer Der Grosser Hanswurst docked this morning. Besides 2,521 immigrants the Hanswurst brought over 213 cabin passengers, among whom were" . . . . . and then follow the names of men known for their riches or their wisdom, and women remarkable for their own or their clothes' beauty. From reading such reports the majority of the stay-at-homes have come to the conclusion that besides the generally poor class of humanity known as immigrants these boats' passengers include only members of the wise, the rich and the beautiful; in fact, that the cabins are veritable meeting places of the democracy of wealth and the aristocracy of brains. It must not be forgotten, however, that many of the first-class, swift ships offer third-class accommodation for the old time steerage, and that not even more persons avail themselves of this opportunity to travel to Europe for 1 cent per mile without extra charge for wholesome food and clean lodging is due to the rule, strictly enforced, of confining the third-class ticket holders to their own quarters, and . . . . . *"Vanite des vanite's, tout est vanite."* For the embryo visitor to Europe to whom vanity or fastidiousness effectively closed the steerage scuttle, while a lack of funds vetoes his entrance to the saloon, the second-cabin door stands invitingly open and at the rate of 2 cents per mile—again food and berth included—the twentieth century steamboat companies accommodatingly bridge the watery waste that separates the old world from the new. Formerly—say twenty years ago—only the rich and the exceedingly poor could afford to "go across," but, as Edgar Saltus said "nothing is constant but change," and it is now even the moderately-with-worldly-goods-endowed citizen who can spend his vacation abroad without giving all his wealth to a steamboat company in return for a first-class cabin ticket, or lowering his standard of living to unknown depths by resigning himself to the fate of the old-time steerage passengers. While ultra patriots may select a steamer for the flag she flies aft, the majority of transatlantic voyagers engage berths on those steamers that are expected to land them soonest at their destination, the latter course being the safest for those misfortunates who are chronic sufferers from seasickness. In short, anyone whose ancestors did heed the warning of the man who admonished them to "go west" can now, by buying a second or third-class steamboat ticket, inexpensively, safely and quickly "go east."

With the tramp's way of living, their manner of securing free transportation, and even the numerical strength of the fraternity the people at large are quite familiar. The marine tramp, or stow-away, seldom selects a vessel bound to an American port for his temporary home, on account of the fact, fully understood by the hoboes of the deep, that the immigration inspectors do not permit any of their ilk to land unless able to prove American citizenship. While the captain of a vessel bound for other shores is often rather pleased when informed that the number of the crew has suddenly been augmented by a non-salary-claiming member, on account of the expense incurred by having to pay his nolens-volens passenger's board-bill during the latter's enforced stay ashore to await the moment of the ship's departure for the return voyage, a stow-away on a trip to the land of the free is soon made aware that he is "personae non grata" with the officers, and the report of his hardships reaching the ears of his confreres has a deterrent effect upon the numbers that otherwise might try the experiment. When a stow-away is detected upon an English craft that is homeward bound he is generally invited to "sign on," either in the capacity of sailor or fireman at the rate of one shilling per month, and the mate or the engineer, according to whether a sailor or a fireman has been created by a stroke of the pen, is pleased with tne unexpected addition to his force. As a rule thev are sailors or firemen, who, having deserted from their ships, and being unable to secure another berth in the port where they are "on the beach," as they express it, engage unpaid for quarters on any vessel that is expected to sail to more promising regions. Should an English captain be able to prove that it was with the knowledge and the assistance of his crew that a stow-away found means to secrete himself, said crew may be convicted and compelled to pay their guest's fare. The "esprit de corps" existing among seafaring men makes it difficult to prove a connivance on the crew's part, and a case, for instance, is known where a stow-away, after breakfasting with the crew presented himself to the captain as a recent inhabitant of the coal bunker. Though the skipper was aware that nobody could pass a night in the coal bunker without accumulating a speck of dust, the usual farce of "signing the articles" was presented on this occasion. For the benefit of those of your readers who wish to stow-away, and who are unable to procure the assistance of any member of the ship's crew may it be mentioned that, according to an old steamboat captain, the lifeboat is a favorite hiding place for these unremunerative passengers. Having reached without detection the outboard side of one of the boats, it is only a matter of moments to partly remove the canvas cover, and luxuriously stretched upon the oars that appear as if arranged for his special accommodation, the passenger by stealth patiently awaits the time when his practiced ear tells him of the severing of the last connection with terra-firma upon hearing the pilot's "bon voyage."

The English government recently ordered 1,000,000 tons of steam coal to be delivered at Gibraltar and Malta, and while the price of this mountain of fuel may only be a drop as compared with the stream of wealth necessary to keep in commission the ship of state, the amount of coal consumed on an ocean-going steam yacht is considered, even by the fabulously wealthy owners, one of the principal items that contribute to making yachting so extraordinarily expensive. While in commission the fires are never drawn, and though the boat may only be used as a ferry to bring the owner from the city to his country place, coal consumption is never entirely suspended, either by day or by night, blow high or low. It was while the interest of nautical humanity was absorbed by the international yacht races that among the numerous craft either gracing or disgracing the occasion by their presence a rakish, narrow and unique appearing boat became conspicuous by the ease with which she distanced well-known speedy vessels, some of these latter being three times her length. Curious were all who watched the progress of the apparently non-coal consuming stranger to be informed as to the power that gave her speed. My case was, no doubt, similar to that of the sailor, who, when asked why he did not follow the captain into the cabin to partake of breakfast, answered that he "did not draw enough water." Anyhow, though only permitted to gaze from the dock upon the little vessel that seems the personification of speed, I gathered that she is called the Standard, so named for the type of gasoline engine she carries. Though unable to give a description of this gasoline engine, it occurred to me that at last the problem, "how to obviate a yacht's coal consumption," has been solved. As stated previously said coal consumption never ceases, but, given a gasoline motor that is sufficiently powerful to drive a modern yacht, and by simply shutting off the supply of gasoline at the end of each trip one can now travel at the rate of a few cents per mile as to cost of operation of machinery. If it is understood that one man can easily handle a gasoline motor, while a steam engine requires firemen and licensed engineers, to say nothing further of those expensive black diamonds, it may safely be predicted that at an early date the motor-propelled craft will be numerically the strongest.

F. H.

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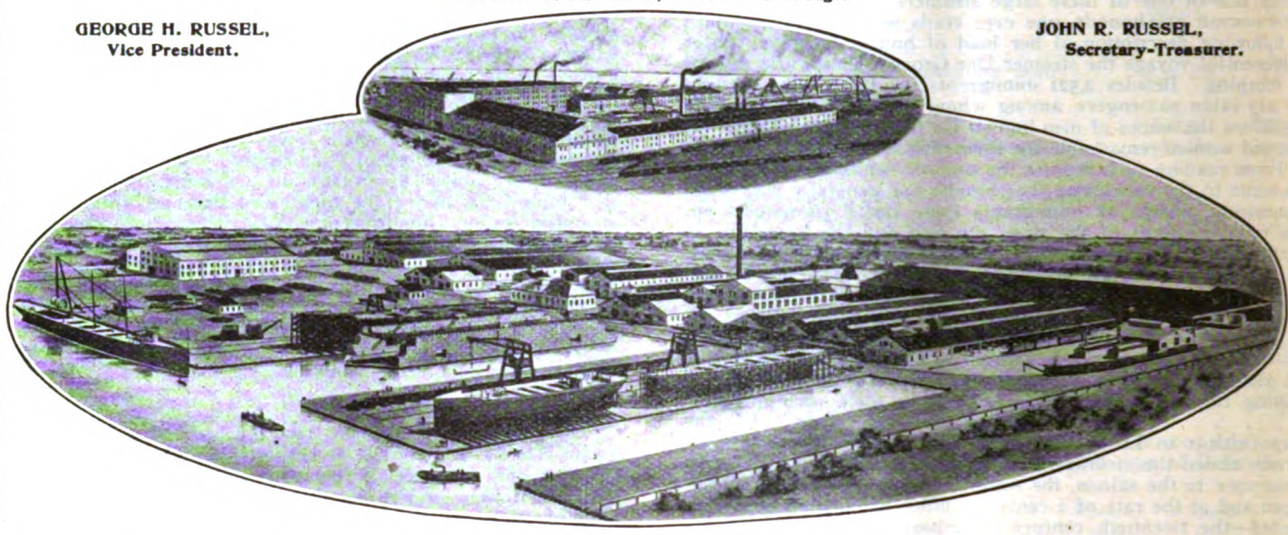

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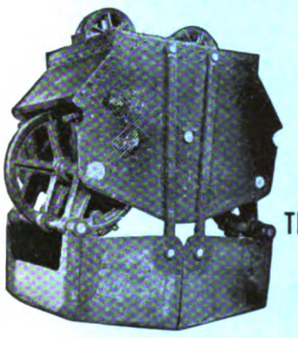

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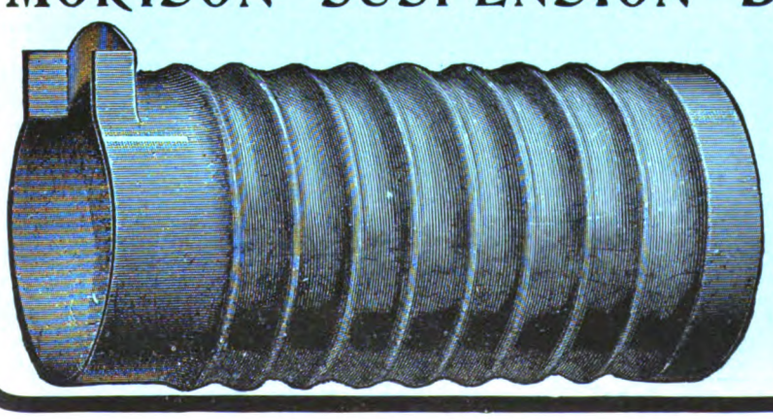

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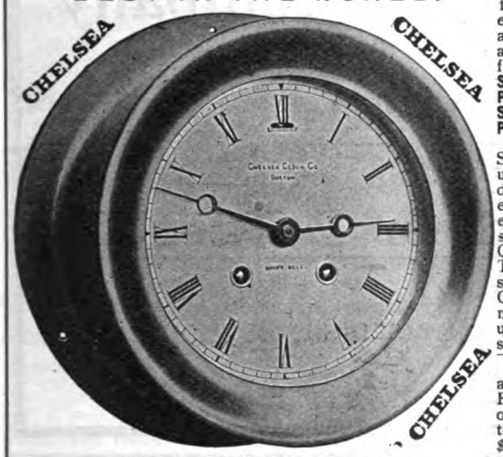

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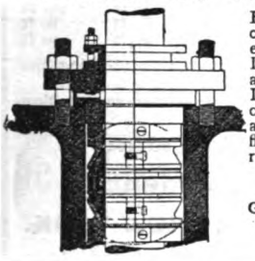

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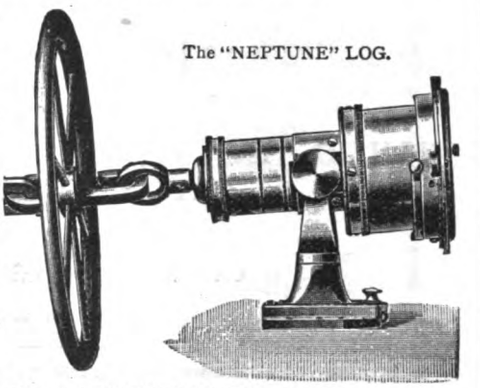

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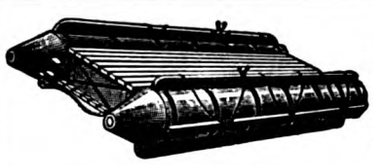

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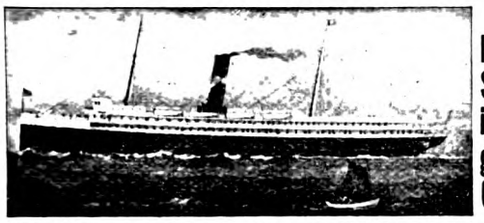

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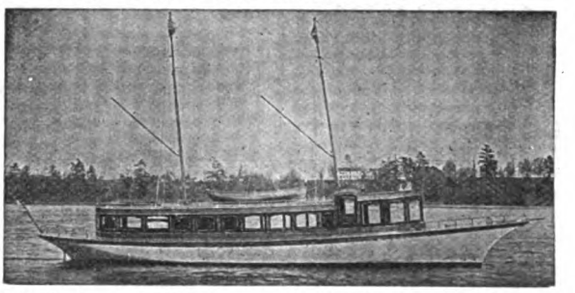

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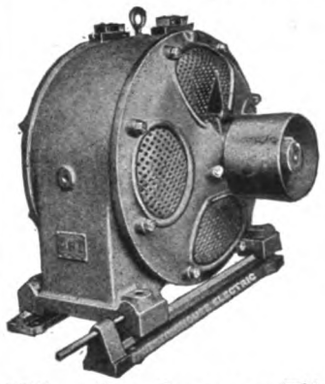

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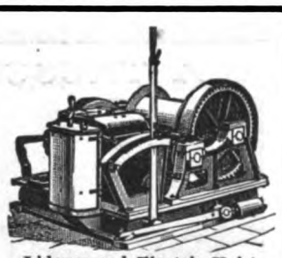

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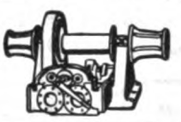

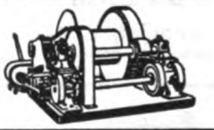

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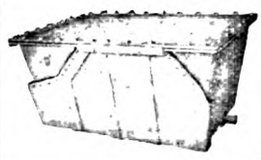

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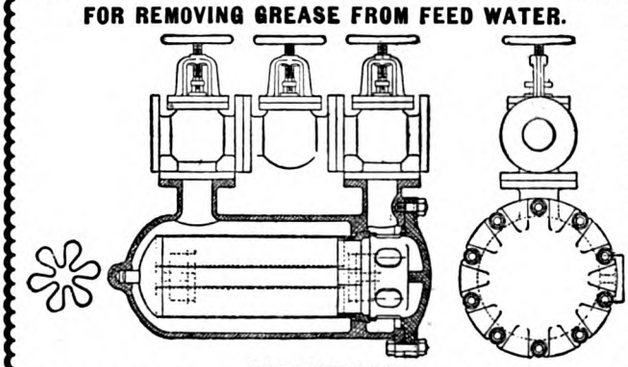

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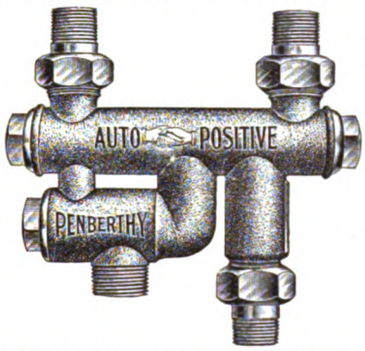

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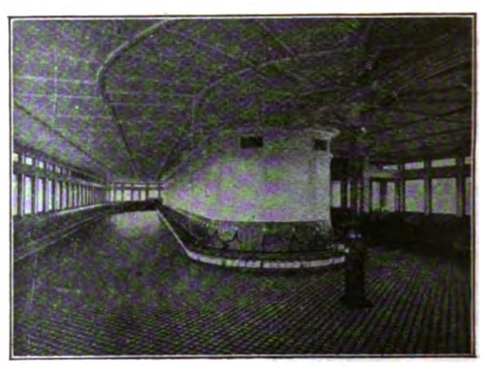

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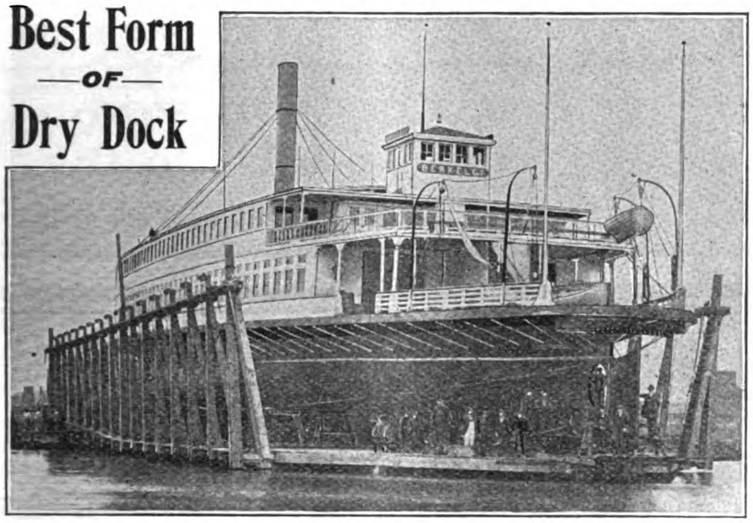

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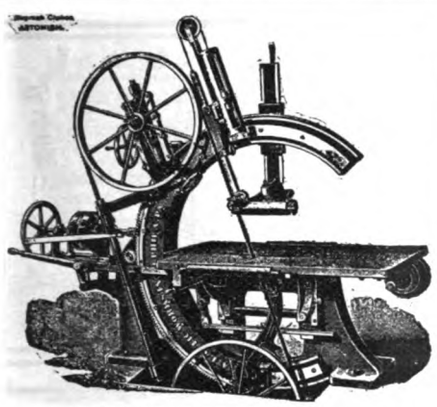

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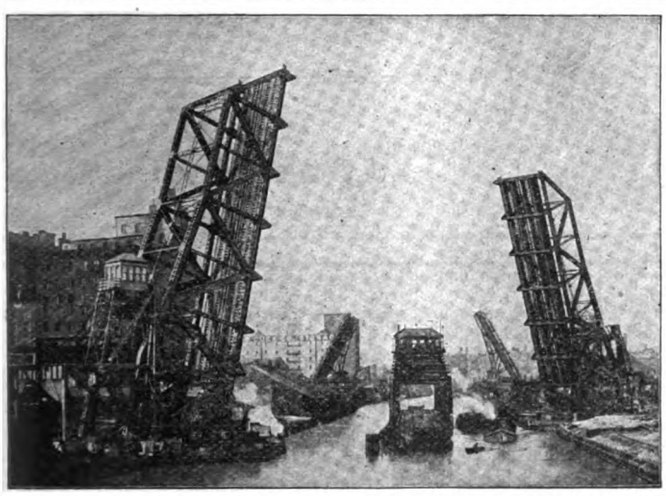

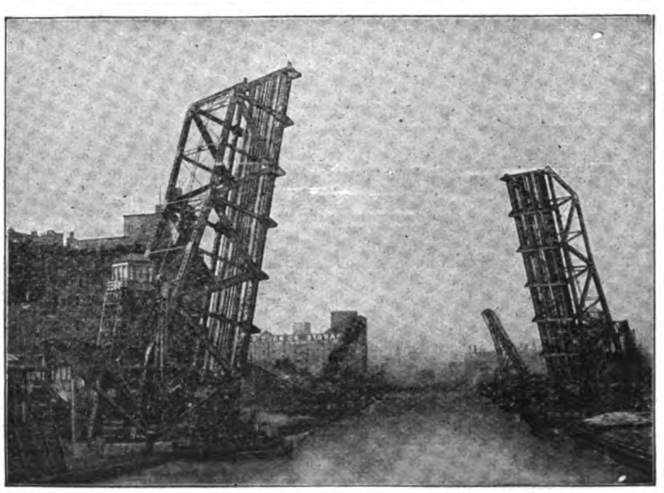

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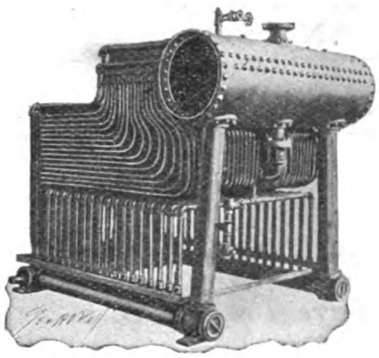

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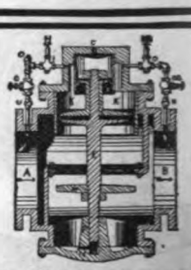

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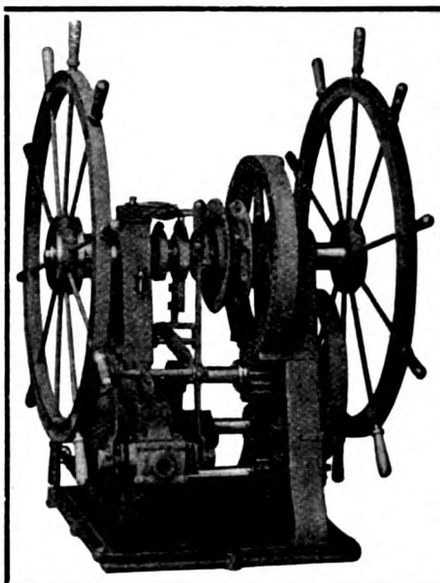

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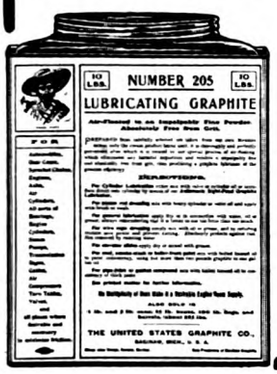

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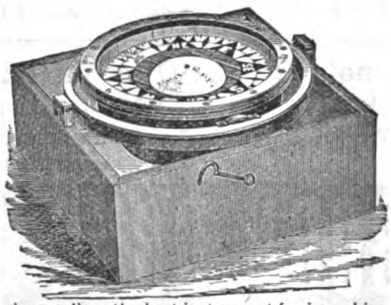

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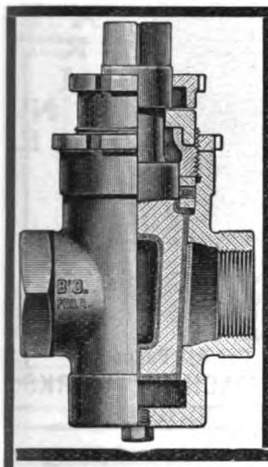

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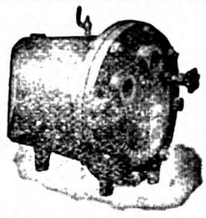

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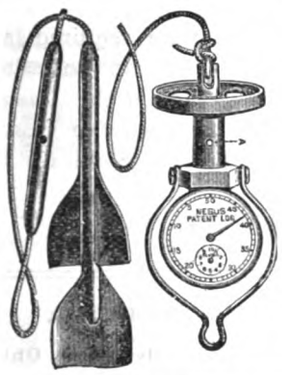

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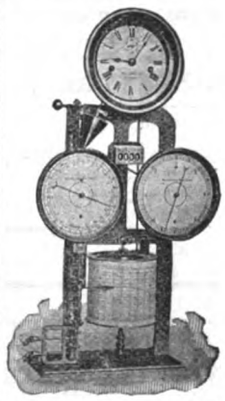

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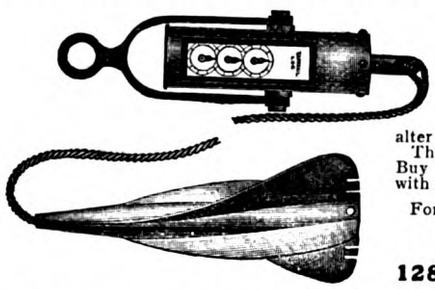

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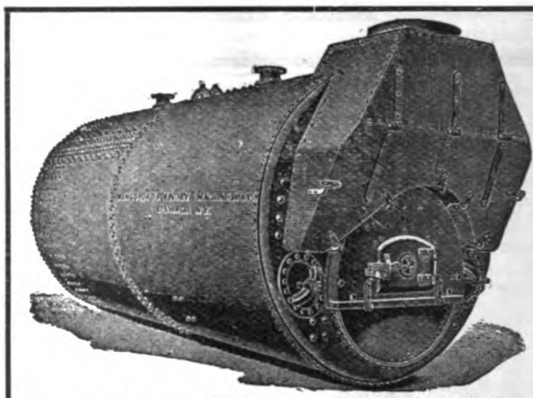

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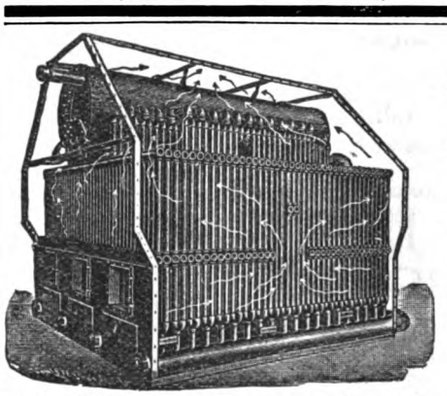

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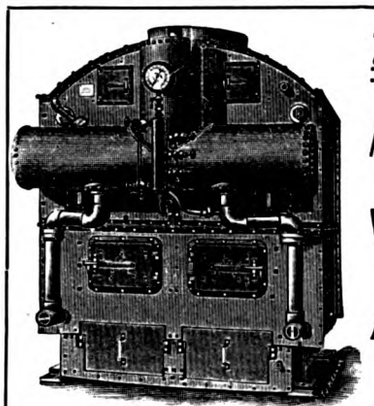

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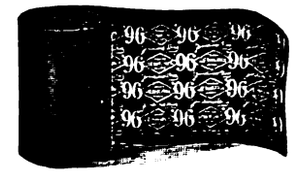

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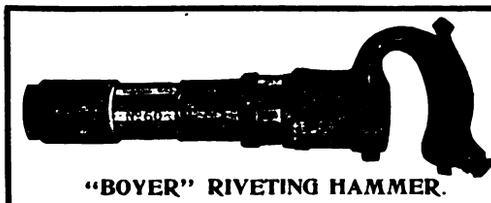

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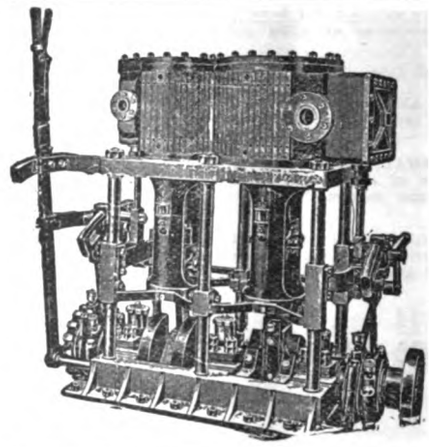

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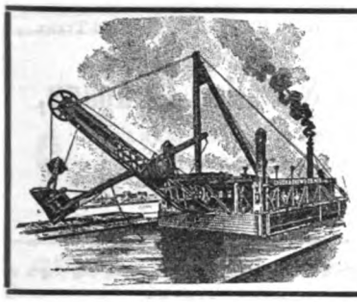

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U. S. Engineer Office, Witherspoon Building, Philadelphia, Pa., August 6, 1903. Sealed proposals for constructing one steel, twin-screw, suction dredge for Savannah Harbor, Ga., will be received here until 12 noon, September 5, 1903, and then publicly opened. Information furnished on application. J. C. SANFORD, Capt. Engrs. Aug. 27

U. S. Engineer Office Witherspoon Building, Philadelphia, Pa., Aug. 21, 1903. Sealed proposals for constructing wooden, single screw, suction dredge for Key West Harbor, Fla., will be received here until 12, noon, Sept. 21, 1903, and then publicly opened. Information furnished on application. J. C SANFORD, Capt., Engrs. Sept. 17

Proposals for Marine Postal Service

Sealed proposals will be received at the Post Office at Detroit, Michigan, until 12:00 o'clock noon, September 10th, 1903, for the service of a steamboat and crew, fully equipped and manned, for the Marine Postal Delivery Service on the Detroit River, for a period of ten years. Full specifications may be seen upon application to the Postmaster at Detroit, Michigan. Bids must be accompanied by certified check for $1,000. Right to reject any and all proposals is reserved, Address JAS. J. LARMOUR, Post Office Inspector. "Proposals for Marine Service." Detroit Mich. Sep. 3

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Harlem.
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Helena.
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Islander. (Thousand Islands—Two Views).
Frank E. Kirby at Put-in-Bay.
Lackawanna.
Mahoning.
Mahoning.
Michigan Central in Detroit River. (Winter).
Mohawk.
Montana.
W. B. Morley, wreck in Detroit River, Aug. 6, 1899.
Simon J. Murphy. (On the Ways).
Simon J. Murphy. (On the Ways—Two Views).
Simon J. Murphy, Launch. (Bow in Slip, Stern not yet in Water).
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Tashmoo, June 9, 1900.
Tashmoo. (Entering St. Clair Flats Ship Canal).
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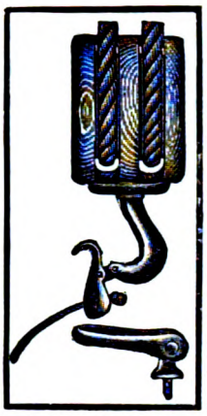

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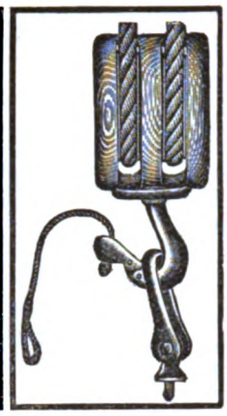

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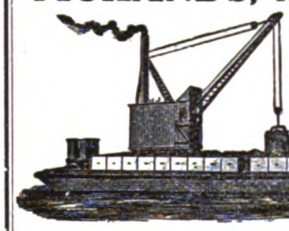

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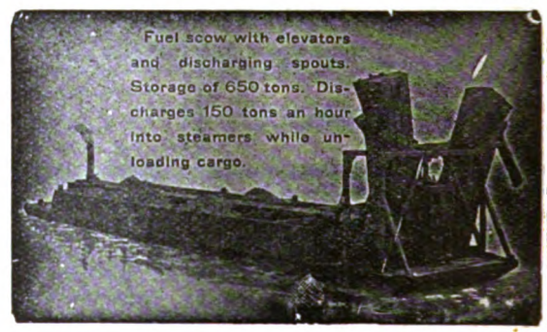
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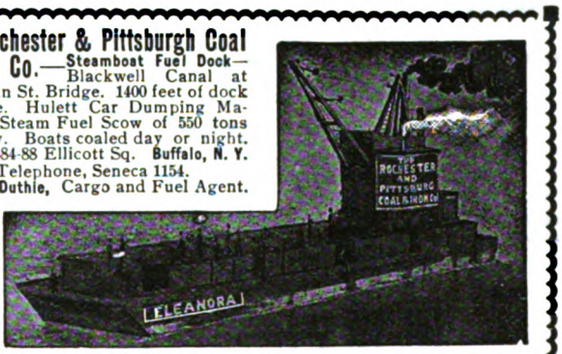

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Lackawanna Ore Docks—unloading ore.
Lackawanna Ore Docks—unloading ore and loading coal.
Unloading Ore from Whaleback, two views.
Unloading Wheat into Elevators, two views.

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Lake Front, from Illinois Central Station.
Illinois Steel Works and Harbor Entrance, South Chicago.

CLEVELAND, O.
Cleveland Harbor from Lake View Park.
American Steel & Wire Co.'s Plant.
Ellsworth Coal Chutes-Dumping Car, two views
Cleveland & Pittsburg Ore Docks, two views.
Ore Docks and Harbor, two views.
Unloading Ore, two views.
Globe Iron Works Ship Yard.
Globe Iron Works Ship Yard, Laying Keel of No. 400.

CONNEAUT, O.
Harbor Entrance.
Unloading Ore—Brown Conveying Hoists, two views.
Unloading Ore—Clam Shell Plant.
Car Dumping Plant, two views.

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Car Ferry turning in ice—two views.
"Michigan Central" entering slip.

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A Freighter Leaving Ship Canal.
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A Lumber Tow.

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General View of Locks from Offices.
Poe Lock, from below, closed.
Poe Lock, from below, open.
Poe Lock, from above.
Poe Lock, with Whaleback.
Weitzel Lock, from above.
Weitzel Lock, from below.
Str. North-Land Passing Locks, two views.
Upper Entrance to Lock Canal.
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Sadler, Perkins & Field .....New York.
Wood, W. J. .....Chicago.

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Stratford Oakum Co. .....Jersey City, N. J.

OIL FOR PAINTING.

Sipe & Co., James B.....Allegheny, Pa.

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Standard Oil Co. .....Cleveland.
United States Graphite Co ..... Saginaw, Mich.

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Jenkins Bros. .....New York.
Katzenstein, L. & Co. .....New York.
New York Belting & Packing Co. .....New York.
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Detroit Varnish Co. ..... Detroit.
Detroit White Lead Works .... Detroit.
Mohawk Paint & Chemical Co.....Norwich, Conn.
New Jersey Zinc Co. ..... New York.
Sipe & Co., James B.....Allegheny, Pa.
United States Graphite Co..... .....Saginaw, Mich.
Upson-Walton Co. .....Cleveland.

PATENT ATTORNEYS.

Thurston & Bates .....Cleveland.

PATTERN SHOP MACHINERY.

Atlantic Works, Inc. .....Philadelphia.

PIPE—BRASS AND COPPER, IRON PIPE SIZE.

Waterbury Brass Co. .....New York.

PIPE-JOINT COMPOUND.

United States Graphite Co..... Saginaw, Mich.

PIPE, WROUGHT IRON.

Bourne-Fuller Co. .....Cleveland.
Crane Co. .....Chicago.
Macbeth Iron Co.....Cleveland.

PLANING MILL MACHINERY.

Atlantic Works, Inc. .....Philadelphia.

PLATES—SHIP, STRUCTURAL, ETC.

Bourne-Fuller Co..... Cleveland.

PLUMBING, MARINE.

Reilly Repair & Supply Co., James....New York.
Sands, Alfred B. & Son.....New York.

PNEUMATIC TOOLS.

Allen, John F. .....New York.
Chicago Pneumatic Tool Co. .....Chicago.

POLISH FOR METALS.

Bertram's Oil Polish Co.....Boston.

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BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

POWER DOORS AND HATCHES.
"Long-Arm" System Co.....Cleveland.

PRESSURE REGULATORS.
Kieley & Mueller .....New York.
Ross Valve Co. .....Troy, N. Y.

PROPELLER WHEELS.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Cramp, Wm. & Sons.....Philadelphia.
Crescent Ship Yard Co.....Elizabethport, N. J.
Detroit Ship Building Co.....Detroit.
Fore River Ship & Engine Co.....Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Hyde Windlass Co. .....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.
Lockwood Mfg. Co.....East Boston, Mass.
Macbeth Iron Co.....Cleveland.
Maryland Steel Co.....Sparrow's Point, Md.
Milwaukee Dry Dock Co.....Milwaukee.
Moran Bros. Co.....Seattle, Wash.
Neafie & Levy Ship & Engine Building Co....Phila.
Newport News Ship Building Co Newport News, Va.
Phosphor Bronze Smelting Co., Ltd. ..Philadelphia.
Risdon Iron Works.....San Francisco.
Roelker, H. B. .....New York.
Sheriffs Mfg. Co. .....Milwaukee.
Superior Shipbuilding Co .....Superior, Wis.
Thropp & Sons Co., J. E. .....Trenton, N. J.
Trout, H. G. .....Buffalo.
United States Ship Building Co.....New York.

PROJECTORS, ELECTRIC.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

PUMPS FOR VARIOUS PURPOSES.
Blake, Geo. F., Mfg. Co.....New York.
Great Lakes Engineering Works.....Detroit.
Kingsford Foundry & Machine Wks. Oswego, N. Y.
"Long-Arm" System Co.....Cleveland.

PUNCHES, RIVETERS, SHEARS.
Allen, John F.....New York.
Chicago Pneumatic Tool Co. .....Chicago.

REFRIGERATING APPARATUS.
Roelker, H. B. .....New York.

REGISTER FOR CLASSIFICATION OF VESSELS.
Great Lakes Register .....Cleveland
Record of American & Foreign Shipping.New York.

RELEASING HOOKS FOR DETACHING BOATS.
Standard Automatic Releasing Hook Co. New York

RIVETING MACHINES.
Allen, John F .....New York.
Chicago Pneumatic Tool Co. .....Chicago.

RIVETS, STEEL, FOR SHIPS AND BOILERS.
Bourne-Fuller Co. .....Cleveland.

RANGES.
Russell & Watson .....Buffalo.

RIVETS—BRASS AND COPPER.
Waterbury Brass Co. .....New York.

SAFETY VALVES.
American Steam Gauge Co. .....Boston.
Ashton Valve Co. .....Boston.
Crane Co .....Chicago
Hayden Mfg. Co., N. L. .....Columbus, O.
Lunkenheimer Co.....Cincinnati.

SAIL MAKERS.
Baker, Howard H. & Co. .....Buffalo.
Upson-Walton Co. .....Cleveland.
Wilson & Silsby .....Boston.

SALVAGE COMPANIES.
See Wrecking Companies.

SEARCH LIGHTS.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

SHEARS.
See Punches, Rivets, and Shears.

SHIP AND BOILER PLATES AND SHAPES.
Bourne-Fuller Co. .....Cleveland.

SHIP BUILDERS.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Buffalo Dry Dock Co.....Buffalo.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Chicago Ship Building Co.....Chicago.
Crescent Ship Yard Co.....Elizabethport, N. J.
Detroit Ship Building Co. .....Detroit.
Fore River Ship & Engine Co. .....Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Jenks Ship Building Co.....Port Huron, Mich.
Lockwood Mfg. Co.....East Boston, Mass.
Manitowoc Dry Dock Co. .....Manitowoc, Wis.
Marine Construction & Dry Dock Co.....
.....Mariner's Harbor, S. I., N. Y.
Maryland Steel Co.....Sparrow's Point, Md.
Milwaukee Dry Dock Co.....Milwaukee.
Moran Bros. Co.....Seattle, Wash.
Neafie & Levy Ship & Engine Building Co....Phila.
Newport News Ship Building Co Newport News, Va.
Risdon Iron Works.....San Francisco.
Roach's Ship Yard .....Chester, Pa.
Shipowners Dry Dock Co. .....Chicago.
Smith & Son, Abram .....Algonac, Mich.
United States Ship Building Co.....New York.
Warrington Iron Works.....Chicago.
Willard, Chas. P. & Co.....Chicago.

SHIP CHANDLERS.
Baker, Howard H. & Co. .....Buffalo.
Moran Bros. Co.....Seattle, Wash.
Reilly Repair & Supply Co., James....New York.
Upson-Walton Co. .....Cleveland.

SHIP LANTERNS AND LAMPS.
Helvig, H. A. J. .....New York.
Russell & Watson .....Buffalo.

SHIP TIMBER.
Martin-Barriss Co. .....Cleveland.
Moran Bros. Co.....Seattle, Wash.
Shurick, F. S. ..... New York.

SMOOTH-ON COMPOUND, FOR REPAIRS.
Smooth-On Mfg. Co. .....Jersey City, N. J.

SPARS—LARGE SIZES.
Moran Bros. Co.....Seattle, Wash.

STAYBOLTS, IRON OR STEEL, HOLLOW, OR, SOLID.
Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

STEAM VESSELS FOR SALE.
Elwell, Jas. W. & Co. .....New York.
Holmes, Samuel .....New York.
King, Rufus S. .....New York.
McCarthy, T. R. .....Montreal, Can.
Newman, R. L. .....New York.
Weeks, F. H. .....New York.

STEAMSHIP LINES, PASS. AND FREIGHT.
American Line .....New York.
Cleveland & Buffalo Transit Co. .....Cleveland.
Erie & Western Trans. Co. .....Buffalo.
Goodrich Trans. Co. .....Chicago.
International Mercantile Marine Co .. Philadelphia.
Pere Marquette R. R. & S. S. Line.....Milwaukee.
Red Star Line .....New York.

STEEL CASTINGS.
Seaboard Steel Casting Co. .....Chester, Pa.
Macbeth Iron Co.....Cleveland.

STEERING APPARATUS.
American Ship Building Co.....Cleveland.
Chase Machine Co.....Cleveland.
Dake Engine Co. .....Grand Haven, Mich.
Detroit Ship Building Co.....Detroit.
Electro-Dynamic Co.....Philadelphia.
Hyde Windlass Co. .....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.
Sheriff Mfg. Co. .....Milwaukee.

STOCKS, BONDS, SECURITIES.
Fahey & Co. .....Cleveland.

SUBMARINE DIVING APPARATUS.
Morse & Son, A. J. .....Boston.
Schrader's Son, A. .....New York.

SURVEYORS, MARINE.
Gaskin, Edward .....Buffalo.
Matteson & Drake .....Philadelphia.
Newman, R. L. .....New York.
See, Horace .....New York.
Wood, W. J. .....Chicago.

TESTS OF MATERIALS.
Hunt, Robert W. & Co. .....Chicago.
Pittsburg Testing Laboratory Ltd. .....Pittsburg.

TILING, INTERLOCKING RUBBER.
New York Belting & Packing Co. .....New York.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.
Allen, John F. .....New York.
Chicago Pneumatic Tool Co.....Chicago.
Watson-Stillman Co. .....New York.

TOOLS, WOOD WORKING.
Atlantic Works, Inc. .....Philadelphia.

TOWING MACHINES.
American Ship Windlass Co.....Providence, R. I.
Chase Machine Co. .....Cleveland.

TOWING COMPANIES.
Donnelly Salvage & Wrecking Co....Kingston, Ont.
Midland Towing & Wrecking Co., Ltd.Midland, Ont.

TRAPS, STEAM.
Kieley & Mueller .....New York.
Lunkenheimer Co. .....Cincinnati.
Sturtevant Co., B F, Jamaica Plain. .....Boston.

TRUCKS.
Boston & Lockport Block Co. .....Boston.

TUBING, SEAMLESS.
Shelby Steel Tube Co. .....Pittsburg, Pa.
Waterbury Brass Co.....New York.

VALVES, STEAM SPECIALTIES, ETC.
American Steam Gauge Co. .....Boston.
Ashton Valve Co. .....Boston.
Bordo, L. J. .....Philadelphia.
Crane Co. .....Chicago.
Farnan Brass Works .....Cleveland.
Hayden Mfg. Co., N. L. .....Columbus, O.
Jenkins Bros. .....New York.
Kieley & Mueller .....New York.
Lunkenheimer Co. .....Cincinnati.
Ross Valve Co. .....Troy, N. Y.

VALVES FOR WATER AND GAS.
Ross Valve Co. .....Troy, N. Y.

VARNISHES.
Berry Brothers, Ltd. .....Detroit.
Detroit Varnish Co.....Detroit.
Detroit White Lead Works.....Detroit.
New Jersey Zinc Co.....New York.
Also Ship Chandlers.

VESSEL AND FREIGHT AGENTS.
Boland, John J. .....Buffalo.
Brown & Co. .....Buffalo.
Elwell, Jas. W. & Co. .....New York.
Elphicke, C. W. & Co. .....Chicago.
Fleming & Co., P. H. .....Chicago
Hall & Root .....Buffalo.
Helm & Co., D. T.....Duluth.
Hawgood & Co., W. A. .....Cleveland.
Holmes, Samuel .....New York.
Hutchinson & Co. .....Cleveland
King, Rufus S. .....New York.
McCarthy, T. R. .....Montreal.
Newman, R. L.....New York.
Mitchell & Co. .....Cleveland
Richardson, W. C. .....Cleveland.
Sullivan, D. & Co. .....Chicago.
Weeks, F. H. .....New York.

VENTILATING APPARATUS FOR SHIPS.
Sturtevant, B. F. Co. .....Boston.

WIRE—BRASS AND COPPER.
Waterbury Brass Co. .....New York.

WIRE ROPE AND WIRE ROPE FITTINGS.
Baker, H. H. & Co. .....Buffalo.
DeGrauw, Aymar & Co. .....New York.
Upson-Walton Co. .....Cleveland.

WHISTLES, STEAM.
American Steam Gauge Co. .....Boston.
Ashton Valve Co. .....Boston.
Lunkenheimer Co. .....Cincinnati.

WHITE METAL—SHEETS, RODS AND WIRE.
Waterbury Brass Co. .....New York.

WINDLASSES.
American Ship Windlass Co.....Providence, R. I.
American Ship Building Co. .....Cleveland.
Hyde Windlass Co. .....Bath, Me.
Jenks Ship Building Co. .....Port Huron, Mich

WINCHES.
American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co. .....Bath, Me.

WOOD WORKING MACHINERY.
Atlantic Works, Inc. .....Philadelphia.

WRECKING AND SALVAGE COMPANIES.
Donnelly Salvage & Wrecking Co...Kingston, Ont.
Midland Towing & Wrecking Co., Ltd..Midland, Ont.

YACHT AND BOAT BUILDERS.
Drein, Thos. & Son .....Wilmington, Del.
Lane & DeGroot .....Long Island City, N. Y.
Marine Construction & Dry Dock Co.....New York.
Rippley Hardware Co. .....Grafton, Ill.
Truscott Boat Mfg Co.....St. Joseph, Mich.
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Willard, Chas. P. & Co.....Chicago.

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J. C. EVANS, Western Manager, Buffalo, N. Y.

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Eastward.	Arrive from West	Depart East.
No. 18, Southwestern Lim	.....	1:50am
No. 22, Lake Shore Lim...	*2:12am	*2:20am
No. 20, Chi & Cleve Ex....	*7:20am	.....
No. 28, N Y & Bost Ex	*7:40am	*8:00am
No. 40, Toledo & Buff Ac.	†10:00am	†10:40am
No. 32, Fast Mail	*11:25am	*11:30am
No. 44, Ac via Sandusky..	†1:40pm	..
No. 46, Southwestern Ex.	....	*3:00pm
No. 116, Conneaut Accom	.....	†4:30pm
No. 6, Lim Fast Mail....	*5:40pm	*5:45pm
No. 26, 20th Cent Lim.....	*7:40pm	*7:43pm
No. 10, C., N Y & B Sp....	*7:30pm	*7:50pm
No. 16, New Eng Ex.....	*10:30pm	*10:35pm
No. 2, Day Express.	†9:10pm	†9 25pm
No. 126, Norwalk Accom.	†7:40am	.....

Westward.	Arrive from East.	Depart West.
No. 11, Southwestern Lim	*3:25am	.....
No. 7, Day Express.....	.....	†6:00am
No. 15, Bost & Chi Sp.....	*3:05am	*3:15am
No. 19, Lake Shore Lim..	*7:00am	*7:15am
No. 23, Western Express.	*10:30am	*10:35am
No. 29, Southwestern Sp.	‡11:10am	.....
No. 33, Southwestern Ex	*12:25pm	.....
No. 133, Cleve & Det Ex..	.....	*12:45pm
No. 47 Accomodation.....	†11.00am	†3:00pm
No. 141, Sandusky Accom.	.....	†3:10pm
No. 43, Fast Mail	*4:35pm	*4:40pm
No. 127, Norwalk Accom..	.....	†5:10pm
No. 37, Pacific Express...	*7:00pm	*7:20pm
No. 3, Fast Mail Lim.....	*10:50pm	*10:55pm
No. 115, Conneaut Accom.	*8:30am	.....

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CLEVELAND, O.

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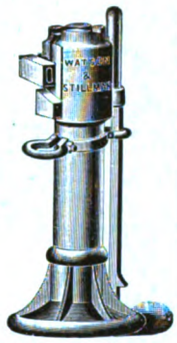

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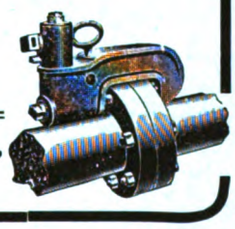

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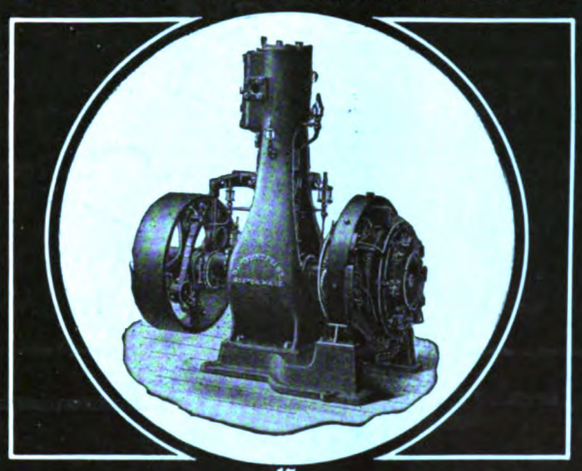

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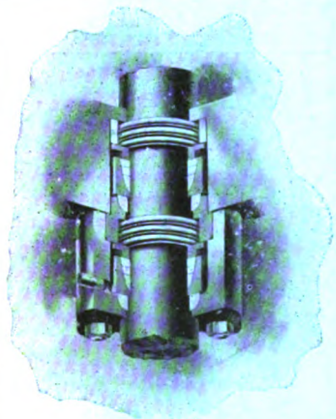

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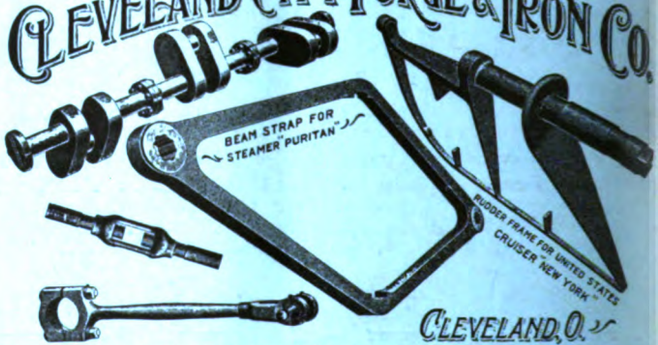

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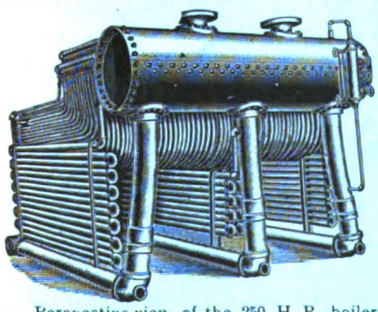

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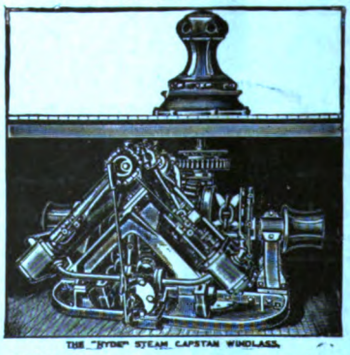

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